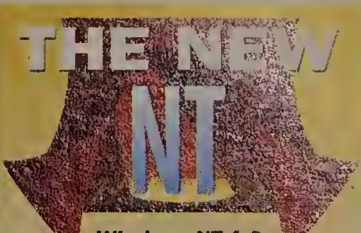
APRIL 22, 1996 VOLUME 13, NUMBER 17

NetworkWorld

THE NEWSWEEKLY OF ENTERPRISE NETWORK COMPUTING



Windows NT 4.0 makes an appearance. For this and other Microsoft news, see page 8.

IBM to give its dumb terminals Web smarts

By Michael Cooney
Raleigh, N.C.

IBM has a surprise for the millions of 3270 and 5250 terminal users who thought the Internet and intranet movement was passing them by.

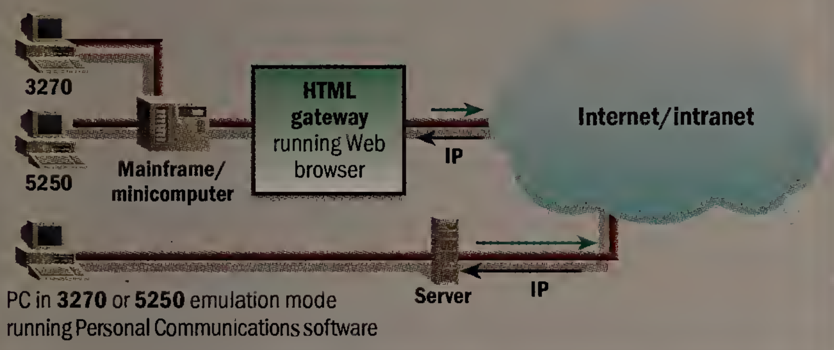
The company is preparing enhancements to 3270 and 5250 host connectivity software that will give users easy access to the World-Wide Web and corporate intranets, IBM executives said during briefings last week.

"We are making a complete shift from protocol-dependent software to protocol-indifferent

See **IBM,** *page 64*

A NEW LEASE ON LIFE FOR IBM TERMINALS AND PCs

IBM's new HTML gateway will enable 3270 and 5250 terminals to access the 'Net, while its new Personal Communications software will give PCs the same capabilities. The products convert between terminal and HTML data formats.


3270
5250
Mainframe/ minicomputer
HTML gateway running Web browser
IP
Internet/intranet
PC in 3270 or 5250 emulation mode running Personal Communications software
Server
IP

ADSL prepped for prime time

By Tim Greene

All the talk about ADSL — the technology that transforms regular phone lines into multimegabit pipes — is starting to turn into action.

AT&T Paradyne has demonstrated an unreleased PC card based on a variant of Asymmetric Digital Subscriber Line that supports bidirectional 384K bit/sec links — ideal for videoconferencing.

US WEST, Inc. has promised 1.55M bit/sec ADSL Internet access by year-end for $60 to $100 per month, and that will eventually drop to $35.

And Ascend Communications, Inc., Madge Networks, Inc., Bay Networks, Inc. and other makers of access

See **ADSL,** *page 64*

Dial up more ADSL info on Network World Fusion, including:
- Primers
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- ADSL news summaries

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LDDS raises service-level guarantee bar

By David Rohde
Jackson, Miss.

LDDS WorldCom is quietly wooing large companies with new service-level guarantees that offer unprecedented compensation for any failure to meet certain installation, outage and service satisfaction levels.

Observers have described the carrier's WorldMark program as a dramatic attempt to induce companies to shift both their voice and data service contracts away from the Big Three carriers.

See **LDDS,** *page 63*

Our special 10th anniversary issue peers into the network industry's future and reflects on its past.

Lotus to help rivals replicate?

Father of Notes mulls giving away keys to Notes kingdom.

By Marc Ferranti and Barb Cole
Maastricht, Netherlands

If Kentucky Fried Chicken gave away its secret recipe, people would call the company nuts. But this is just what Lotus Development Corp. may do with its jealously guarded Notes replication specification, according to Notes inventor Ray Ozzie.

Lotus will give away this critical technology as long as rivals Microsoft Corp. and Netscape Communications Corp. pledge not to start a replication standards war.

With their backing, Lotus is hoping that its Notes replication scheme will be accepted as a standard for the exchange and updating of documents over the Internet and across competing databases, according to Ozzie, president of Iris Associates, Inc., the Westford, Mass.-based Lotus subsidiary that develops Notes. Both Netscape and Microsoft have been working on their own replication engines, but their technology is still no match for Notes.

"If the replication specification becomes a standard, it will help us. It advances replication across the industry, gives people a taste for it, and we will always be able to do it better [than rivals] with Notes."

Ray Ozzie, Lotus subsidiary Iris Associates

"We used to be worried — the business guys were always worried — that exposing our tech-

See **Lotus,** *page 63*

Islands in the datastream

Ken Perryman takes the bait: the chance to bring networking to one Florida county.

By Charles Bruno

KATHLEEN GOFF

With the ever-growing tangle of equipment from different vendors, incompatible network protocols, endless new programming interfaces and network services that require constant coddling, some network managers may wish they could just tear it all out and start from scratch.

Ken Perryman is making that wish come true.

Perryman had a job many network personnel would covet: He

Continued on page 50

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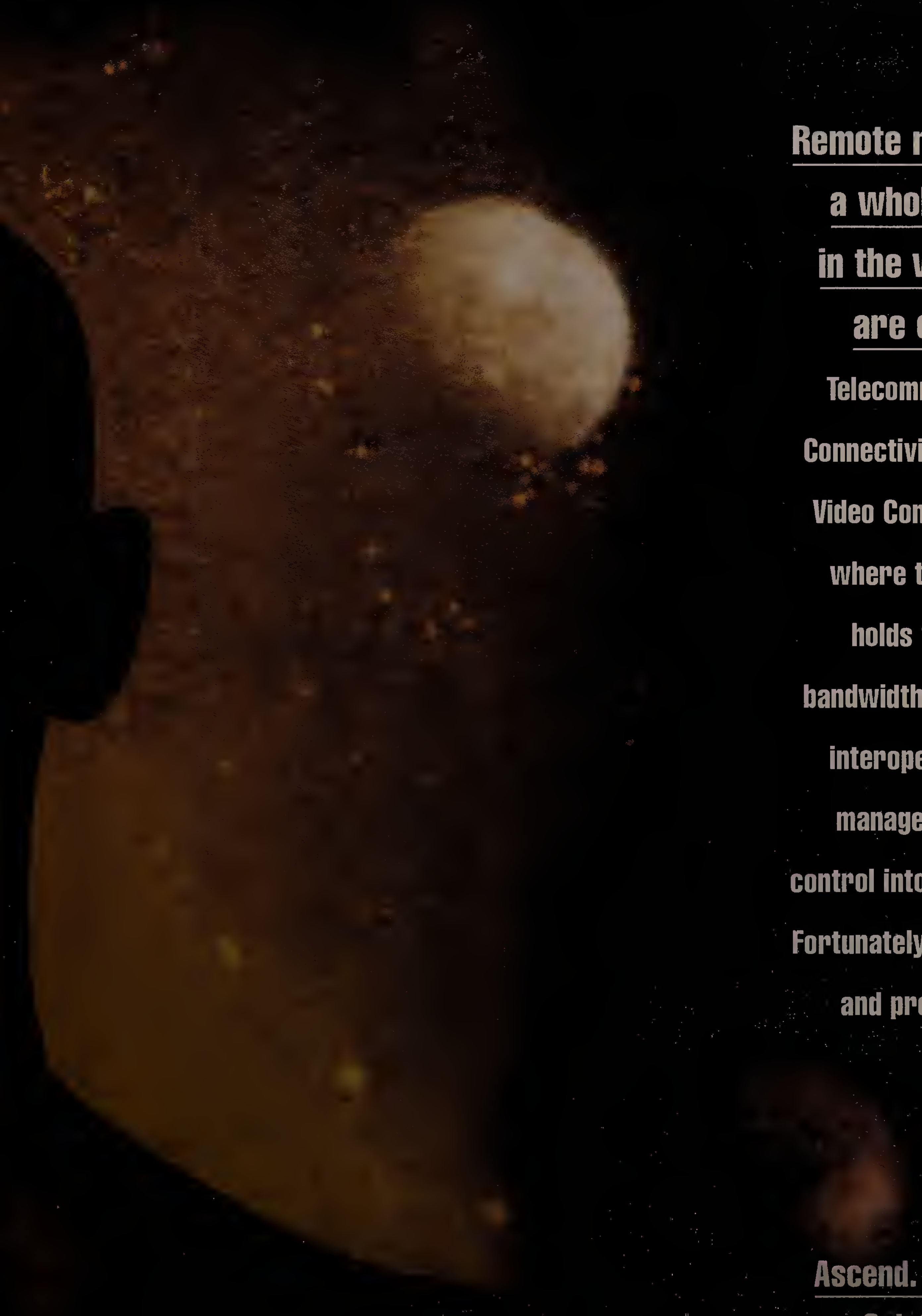

Remote networking invokes a whole new paradigm in the way corporations are communicating.

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This Week

News+

Look for news too hot to hold. New updates posted by 1:30 p.m. EST, Monday through Friday.

The Front Page

Groupware replication: Even as Lotus considers making its replication specification a free standard, the World-Wide Web Consortium is examining ways to bring replication-like features to the Web, in part through existing protocols. We've got links to their documents.

- LAN migration: Look up articles on moving from host-based nets to LANs — and pick up a few Key West fishing tips in the bargain.
- DCE: IBM engineers aren't the only people looking to link the Distributed Computing Environment with the Internet. See how the Open Software Foundation is working to tie DCE to the World-Wide Web.

The Technical Sections:

- AS/400: Take a look at the new Intel-based front ends IBM is building for its AS/400 platforms, and see how IBM plans to fend off Microsoft's BackOffice suite, in WANs & Internetworking.
- Check out reviews of Web authoring tools, then download beta and shareware versions to try out, in Intranets & the 'Net.
- Find out how Lotus is making it easier to develop Notes applications, in Client/Server Applications.

Forum

- Stumped by a networking problem? Ask other users for help in Help Desk. Or if you know the answer, jump right in.

this week's pick

Looking to develop a data-warehousing strategy? Start with Prism Solutions, Inc.'s primer, "What is a Data Warehouse?" You'll find it at http://www.cait.wustl.edu/cait/papers/prism/vol1–no1/.

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CONFERENCE PICK

HOT TOPIC

Give Backspin columnist Mark Gibbs a piece of your mind (http://www.nwfusion.com).

Select Forum, Columnists, then Gibbs.

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NetworkWorld's *Mission: To provide news and analysis that help network IS professionals deliver the network computing infrastructure and distributed applications required to meet evolving business needs.*

News briefs, April 22, 1996

OpenMail opens up to the 'Net

■ Following the flood of companies rushing to make their software applications accessible over the World-Wide Web, Hewlett-Packard Co. at next week's Electronic Messaging Association annual conference will announce its Internet Collaboration Services for OpenMail.

HP will show its new OpenMail Web client, which can be accessed from any Web browser by connecting to a Web server or home page and entering a password. The Cupertino, Calif.-based company also will announce OpenMail's support for any Post Office Protocol 3 (POP3) Internet clients. HP later will extend support to Internet Message Application Protocol 4, the next generation of POP3.

3Com trots out Trinity

■ 3Com Corp. this week will announce a new remote access device, code-named Trinity, that will support a wide breadth of WAN and LAN connections. The box will be based on a platform capable of supporting future services such as Asymmetric Digital Subscriber Line. The product is designed for large companies and Internet service providers. Pricing and availability information was not available.

IBM Fast Ethernet hubbub

■ IBM has added an eight-port Fast Ethernet hub to its repertoire. The 8223 Fast Ethernet Workgroup Hub is a stand-alone IEEE 802.3u 100Base-TX unmanaged workgroup hub that supports standard unshielded twisted-pair wiring for workstation connectivity or to daisy chain with other 8223s. It will be available this month. Pricing was not available.

MCI gets hyper

■ MCI Communications Corp. last week announced HyperMedia, a multimedia storage and retrieval service targeted at video-on-demand, groupware, training and telemedicine applications. The service is in beta testing at NBC News, which has hooked 20 affiliates to an MCI server farm via Asynchronous Transfer Mode, frame relay or Switched Multimegabit Data Service. The affiliates can search for video content applicable to their news programs and download it to their workstations.

Bug busting holds up Notes

■ Lotus Development Corp. last week said it will delay the shipment of Notes 4.1 until April 29, about 10 days later than it originally planned. The delay resulted from additional code testing, company officials said. Version 4.1 adds support for OS/2, Macintosh, Unix and Windows NT clients, as well as Windows 95, Windows NT and NetWare servers.

A secure purchase

Bidzos

■ Security Dynamics, Inc., which makes the SecurID line of dynamic password tokens and servers for authenticating user identity on the network, last week said it will pay $200 million for RSA Data Security, Inc. RSA licenses use of public-key encryption patents and sells the BSafe encryption tool kit. Chuck Stuckey, Security Dymanics' chief executive officer, said Jim Bidzos will remain head of RSA and the company will continue to license the public-key technology used widely in electronic commerce and security applications.

And the Web votes 'Yea'

■ In a first ever congressional on-line petition, the office of Sen. John Ashcroft (R-Mo.) got the Senate Rules Committee to agree to use a World-Wide Web site to survey citizens about the pending congressional term limit amendment.

The survey data will be presented to the Senate Tuesday when it gathers to vote on the issue. Of the 30,000 times the Web site was visited, only 4,500 people filled out the survey. The rough count as of last Thursday: some 4,000 in favor of term limits and 500 opposed.

NYNEX-Bell Atlantic merger OK for users

By David Rohde and Tim Greene
New York

A tingle of excitement swept through the user community in the Northeast last week as Bell Atlantic Corp. and NYNEX Corp. appeared close to a go or no-go decision on a much-discussed merger.

NYNEX customers in particular, including many who have been frustrated by shifting NYNEX account teams and spotty responsiveness, held out hope that a Bell Atlantic takeover would lead to service improvements.

"It's pretty exciting," said one Wall Street telecommunications manager here who asked not to be identified. "It would create more of a powerhouse because Bell Atlantic is way ahead of NYNEX in some ways, such as on ISDN."

A merger could temporarily ease pressure on Ivan Seidenberg, NYNEX chairman and chief executive officer, because he would likely take the No. 2 role in the company to Bell Atlantic Chairman and CEO Raymond Smith. At last November's Communications Managers Association convention here, users hammered Seidenberg about NYNEX's account teams, with some users complaining it took six months to get new account representatives up to speed.

Other users are satisfied with their account teams but said back-office support has been lacking. "They have cut them to the bone," said John Dubiel, manager of planning for Boston Edison Co. "There just aren't enough people in place to do the work for the customers."

But Bell Atlantic has not been immune to service and support problems, either. Its recent goofs include misdirected messages in its public voice mail service and an incorrect mailing to more than 300,000 Virginia businesses and homes about an area-code change.

NYNEX and Bell Atlantic successfully established Bell Atlantic NYNEX Mobile in 1994. They also have forged a link across the Hudson River to offer frame relay service between New York City and a handful of New Jersey counties.

Bell Atlantic on its own has aggressively marketed ISDN, network management services and products based on its advanced intelligent network, such as caller identification and extended Centrex. In addition, it is pioneering the use of Asymmetric Digital Subscriber Line technology with its video-on-demand trials.

NYNEX lagged until last fall, when it announced a sweeping network upgrade that includes an Asynchronous Transfer Mode backbone and hundreds of millions of dollars for upgrading all of its central offices to support ISDN.

By joining NYNEX to its hip, Bell Atlantic would gain first dibs on the nation's leading banks, brokerage houses and insurance companies. NYNEX currently enjoys a bulk deal with the Securities Industry Association for its Enterprise package of local data services.

"Bell Atlantic could do a lot for NYNEX," said Daniel Briere, president of the TeleChoice, Inc. consultancy in Verona, N.J. "NYNEX is a lot of raw material that Bell Atlantic can mold into a tremendous telecom machine." ■

Users, carriers tell the FCC to stick to basics when it comes to universal service. Page 63.

BIG BEHEMOTH OF THE EAST?

Vital statistics of Bell Atlantic and NYNEX:

	Number of ISDN lines in service	Number of employees
Bell Atlantic	145,000	62,050
NYNEX	90,000	65,800

	'95 revenue	'95 earnings
Bell Atlantic	$13.4 billion	$1.9 billion
NYNEX	$13.1 billion	$1.4 billion

Note: The Bell Atlantic NYNEX Mobile joint venture alone accounted for $1.7 billion in 1995 revenue.

SOURCES: COMPANY REPORTS, SALOMON BROTHERS, NEW YORK

A B E N D

abend *(n)* **1:** abnormal end to a computer process **2:** the on-line fountain of 'Net wit and high-tech humor found on Network World Fusion (www.nwfusion.com).

Navigating the Jargon jungle

It's an ever-changing cyberworld out there, and even the most experienced network professionals sometimes need to brush up on the basics, return to their roots and otherwise avail themselves of additional alliterative avenues of knowledge.

Fortunately, there is no shortage of on-line refresher courses to help you keep up with the Gateses. A particularly dubious — sorry, we meant detailed — glossary of computer terms can be found in Network World Fusion (http://www.nwfusion.com). In it, you will find useful definitions for terms such as "beta" (Latin for "still doesn't work") and "reference manual" (an object that raises the monitor to eye level).

Visit Network World Fusion. Select NetRef then Abend.

NetworkWorld Fusion

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NT 4.0 to pool modems and surf the Internet

By Kevin Fogarty

Los Angeles

Bill Gates' plug for Exchange may have gone over like a lead balloon at NetWorld+Interop 96 earlier this month, but demos of the upcoming Windows NT 4.0 pumped up the crowd at the Tech Ed conference here last week.

While Gates took the bows for the flashy interface demo, an unusual twist in remote access really bowled over attendees. Frank Artale, group program manager for NT development at Microsoft Corp., showed off NT 4.0's ability to combine the bandwidth of two modems for use by a single machine, a sort of inverse multiplexing for PC data.

NT 4.0 beta features

- Modem aggregation
- Personal Web server
- Bloodhound net monitor
- DNS server and GUI administration
- Multiprotocol routing
- NetWare logon script support
- Administrative Wizards
- Internet Explorer 2.0 and 3.0 beta
- Internet Information Server

The feature, called multilink/channel aggregation, would give a remote user twice the bandwidth for the cost of an extra line and modem. Attendees applauded the feature, but some raised concerns about expanding modem pools as users demand multiple simultaneous dial-in connections.

But the 'Net nearly stole the whole show. The Microsoft chairman drew cheers from the crowd at his keynote when he showed NT 4.0 running with a set of Internet add-ons that combine the user interfaces of Windows 95 and the Internet Explorer browser.

The combination, called Page View, allows users to see a list of their files on one side of a screen, just as they would in File Manager, while displaying a World-Wide Web page simultaneously on the other side of the screen.

The file view includes not only a list of files on the NT machine, but also a list of recently visited Web pages. Users will be able to click on any URL in the file view and go there automatically, Gates said.

NT 4.0 also includes a personal Web server that can publish HTML pages across any peer-to-peer connection. The feature makes it possible to use an NT workstation as an intranet server or simply as a place to view new HTML pages before publishing them on the Internet Information Server, which ships with NT Server, Gates said.

The Internet add-on package is scheduled to ship late this year, sometime after the projected summer ship date for NT 4.0, Gates said.

Gates also confirmed that the Cairo release of NT Server, which was most recently slated for a late 1997 release, could slip to 1998. At NetWorld+Interop, other Microsoft officials raised the possibility of a 1998 Cairo ship date following the announcement of a plan to replace the flashy object-oriented Cairo directory and filing system with a more prosaic directory based on the one in Exchange.

Users did not seem interested in Cairo ship dates, but many were impressed with the demo. "I've always thought the Web had a well-organized way to go back and forth between pages," said Mike Cohen, programmer analyst for the information services division of the county of San Bernardino. "To be able to do that with the rest of your files would be great."

The dual-purpose user interface is great because it will help standardize the front ends to multiple applications, reducing training and maintenance costs, and makes it easier for users to access multiple networks, according to Mike Demeter, network manager for a small Midwest publishing company.

However, making access easier does nothing to ease the jobs of network planners, who will have to deal with even more dire bandwidth and net design issues as users blithely click for access to files that could be 10 or 15 router hops away.

NT 4.0 also includes a host of Administration Wizards that reduce the number of steps required for common administrative tasks, the ability to view and selectively shut down background processes, a lightweight multiprotocol router and the ability to run NetWare 4.X client logon scripts with support for Novell Directory Services.

There is also a network monitor called Bloodhound, a lightweight packet trace mechanism designed for troubleshooting small NT networks. ■

Microsoft keeps pressure on with release of Internet Explorer

By Kevin Fogarty

Los Angeles

Microsoft Corp. is trying to keep the pressure on rival Netscape Communications Corp. with a continuing set of enhancements for its Web browser.

The first version of Internet Explorer shipped with Windows 95 last August, the second version is in beta now, and the third is slated for a beta release this summer.

Explore more info on Network World Fusion, including:

- An overview of proposed Web style sheets
- A copy of Microsoft's ActiveX software developer's kit, which Includes a beta version of Internet Explorer 3.0

NetworkWorld Fusion Select News+ then Intranets & the 'Net.

http://www.nwfusion.com

Each release will be more closely intertwined with the Windows interface, Microsoft officials said.

Internet Explorer 2.0, which is included in the NT 4.0 beta version, includes the ability to browse three-dimensional pages and render art progressively so users can see large art files gradually as they download. Explorer 2.0 also includes support for HyperText Transport Protocol cookie files for customizing the browser and support for the Secure Sockets Layer security protocol.

Also, it will include a dialer and its own TCP/IP stack for Windows 3.1 users who do not have TCP/IP capability, as well as a free add-on for Virtual Reality Markup Language support.

Version 3.0 will support the World-Wide Web Consortium's StyleSheets guidelines, ActiveX and Visual Basic scripting, and Dynamic HTML, said Dave Fester, browser technology product manager at Microsoft.

The new version also will include the ability to set limits on the kinds of Web pages the browser can display — a feature designed to appeal to parents worried about what sites their children are viewing, Fester said.

It will support ActiveMovie, a Microsoft technology that will download a large graphic file in a stream, letting it run as it comes across the wire. Without that support, large files would first have to be stored on a hard disk and then run locally. ■

Microsoft 'Net proxy server nears beta test

By John Cox

Los Angeles

Microsoft Corp. last week unveiled details of its Internet proxy server, called Catapult, which is intended to give companies secure, high-performance links to resources on the Internet and intranets.

Catapult gives net administrators the tools to control more precisely which corporate users can access which Internet or intranet resources. And a set of caching algorithms enables Catapult to store certain Internet information in memory, providing end users with fast response times.

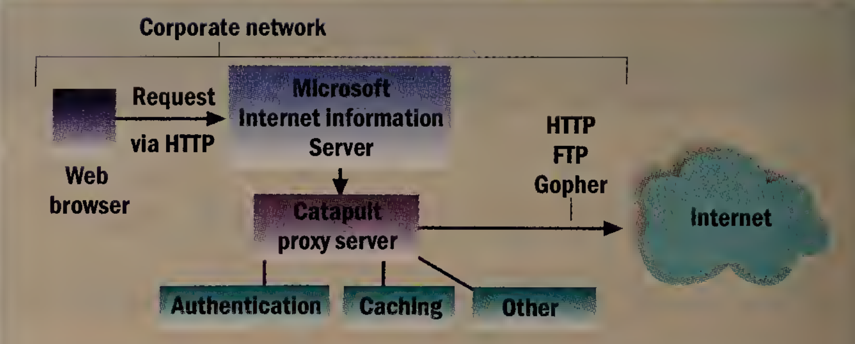
Details of the product, set to enter extensive beta testing in June, were disclosed in sessions at the Microsoft Tech Ed '96 technical conference here.

Proxy servers are programs that act on behalf of Internet clients, forwarding requests to Internet resources, such as World-Wide Web or File Transfer Protocol servers. Typically, proxies are like an outgoing tunnel under the corporate firewall, which protects the corporate network from unauthorized external access. Just as importantly, proxy servers can reduce network loads and response times by caching information.

Catapult runs on top of Microsoft's Internet Information Server, which in turn runs on the Windows NT Server operating system.

Catapult handles security and authentication at the application level, instead of the transport level security offered by the typical firewall, according to Kerry Schwartz, Microsoft's program manager of Internet technologies in the business systems division. A typical firewall grants access based on such things as IP addresses and port numbers.

Microsoft to launch Catapult proxy server



Catapult stands in for clients looking to access the Internet. A client equipped with a Web browser passes a request on to Catapult, which can do such things as authenticate and determine access privileges. If possible, it responds from information cached locally; if not, it calls up the right protocol and accesses the Internet.

SOURCE: MICROSOFT, REDMONO, WASH

Catapult can be configured to require more authentication than just an IP address and be used to grant various privileges to different individuals or groups.

"We think this proxy server will be more secure than the typical firewall," Schwartz said. "Our view is you won't need a firewall with Catapult. But if you want one, you can use both."

"Firewalls can be spoofed, and that's becoming easier to do," said John Ryan, senior systems designer with the Norco division of DynCorp, Inc., which provides technical services to the Department of Defense. "The added security at the application level [by Catapult] is important to us."

Because Catapult uses Microsoft Internet Services API, programmers can develop and add features to Catapult to meet unique needs at their sites.

No release date or pricing was disclosed for the product. ■

Mike wants to upgrade his company to Lotus Notes Release 4.

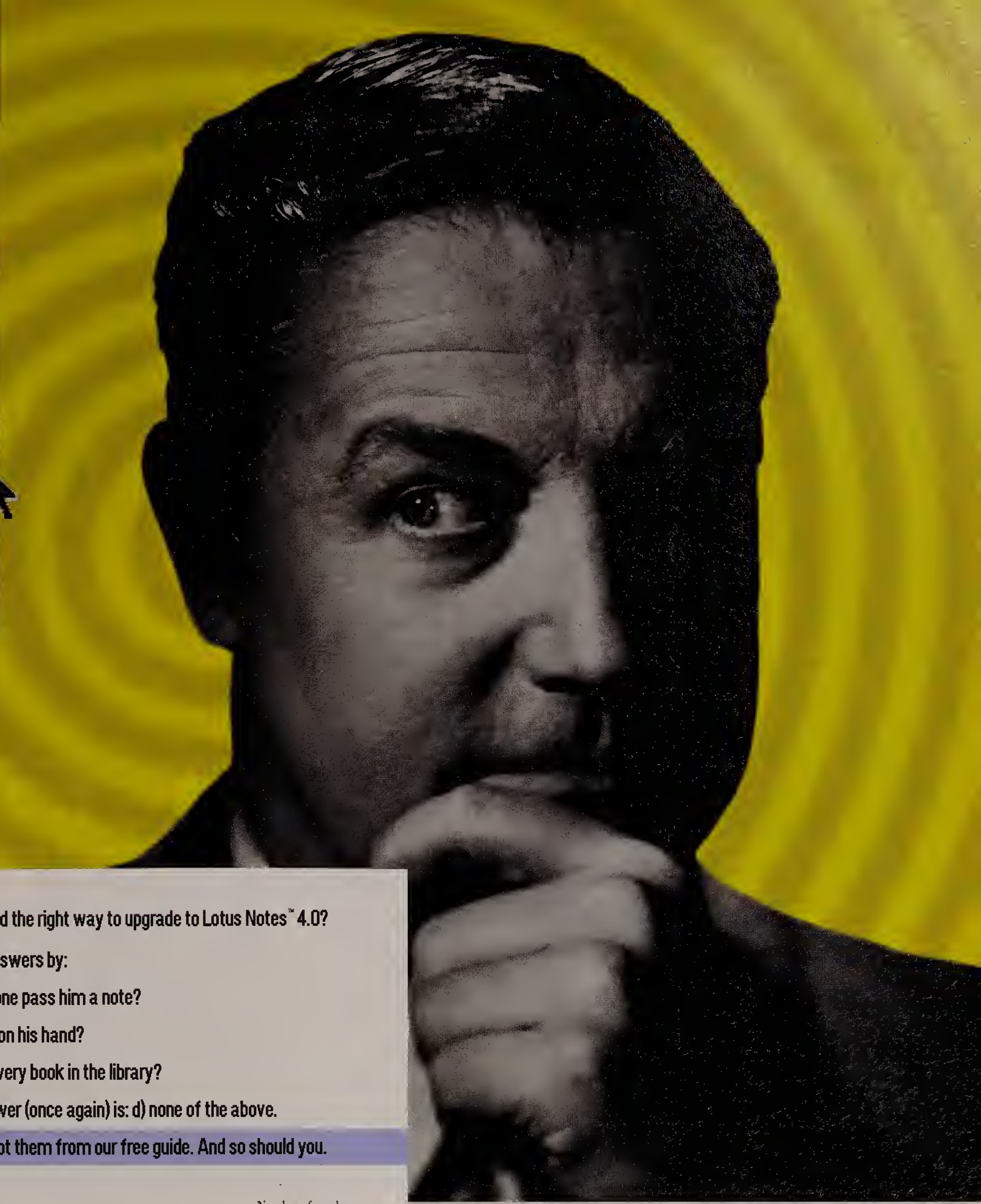
If 2,352 people in 8 departments will use it, how many servers will Mike have to add?

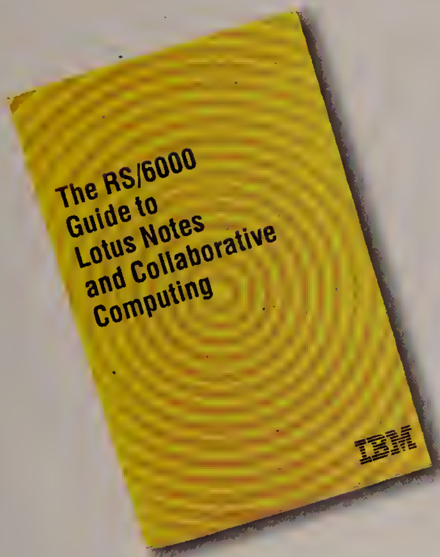
a) 4 b) 8 c) 12

The correct answer is:
d) None of the above.

Because Mike chose the RS/6000 Notes Server, he can add users without adding servers.

Boy, that was an easy one.




The RS/6000 Guide to Lotus Notes and Collaborative Computing
IBM

How did Mike find the right way to upgrade to Lotus Notes™ 4.0?

Did he get the answers by:

a) Having someone pass him a note?

b) Writing them on his hand?

c) Memorizing every book in the library?

The correct answer (once again) is: d) none of the above.

Actually, Mike got them from our free guide. And so should you.

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Number of employees:
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☐ 101 to 500
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Partners rally around new 64-bit Unix operating system

By Ben Heskett
San Francisco

For years, vendors have been talking about a common version of Unix. Consortium after consortium has promised to solve compatibility problems, but to no avail.

Now The Santa Cruz Operation, Inc. (SCO) is taking another stab, and while it is worlds away from a single Unix, it is making progress — at least on Intel Corp. platforms.

SCO this week will announce, with several prominent partners, the first specs in a two-year process to deliver a 64-bit "modular" architecture, code-named Summit 3D. SCO intends to unify the Unix-on-Intel market as much as possible using UnixWare and 64-bit technology.

Versions of Unix from Unisys Corp., NCR Corp., Siemens Nixdorf Information Systems, Inc. and Data General Corp. will all incorporate the SCO specs. DG could add an SCO-based file system module, for instance, while retaining its strong symmetric multiprocessing features.

But cohesion remains difficult. SunSoft, Inc.'s Solaris and IBM's AIX do not support the plan. Digital Equipment Corp. and Silicon Graphics, Inc. have already moved to 64 bits with their own brands of Unix.

However, the initiative will move forward with heavyweight Intel, which will announce that current 32-bit compilers will port to a 64-bit environment. A 64-bit chip from Intel, dubbed Merced, is due in late 1997.

Compaq Computer Corp. will also support the new SCO product via integration with SmartStart, its software configuration utility. ■

SCO'S NEW 64-BIT UNIX PARTNERS

- Compaq
- DG
- ICL
- Intel
- NCR
- Olivetti
- Siemens-Nixdorf
- Unisys

Vendors rally around gigabit E-net

By Jodi Cohen

With Asynchronous Transfer Mode struggling to get off the ground, an opening for fast LAN alternative gigabit Ethernet has emerged. However, analysts said gigabit Ethernet products must be brought to market quickly — before ATM gains momentum — or risk missing this opportunity.

That's why a coalition of networking vendors next month will announce the formation of the Gigabit Ethernet Alliance, a consortium that will help drive the standardization of Ethernet at 1G bit/sec data rates.

Initially, the alliance will have at least 10 members, including 3Com Corp., Compaq Computer Corp. and Sun Microsystems, Inc., according to sources familiar with the group's plans. Other vendors, such as Bay Networks, Inc., Cisco Systems, Inc., Hewlett-Packard Co. and Intel Corp., are still waffling.

Industry observers said the alliance must work toward the development of a single standard if gigabit Ethernet has a chance of gaining widespread industry support. The alliance, however, has not yet committed to this as one of its goals.

Two IEEE committees are tackling the same problem. The 802.3 committee is working to standardize gigabit Ethernet, which will be used as a backbone technology for switch-to-switch connections (*NW*, Dec. 18, 1995, page 1).

Cogent outlines gigabit Ethernet plans. Page 27.

At the same time, the 802.12 committee is working on a rival gigabit LAN technology that uses the Demand Priority frame format championed by HP in its 100VG-AnyLAN technology (*NW*, Jan. 8, page 1).

Analysts said the feuding sides must join hands. "Right now, ATM is stumbling a bit, and there is a small window of opportunity for gigabit Ethernet to emerge," said Skip MacAskill, senior research analyst at Gartner Group, Inc., a consultancy in Stamford, Conn. "But if there is any sort of fracture, it will delay the delivery of interoperable products and gigabit Ethernet will lose its window to ATM."

Brice Clark, strategic planning manager at HP's Roseville Networks Division, agreed on the need for a common standard.

"We'd like to see a single standard emerge that we can use in both VG and 100Base-T environments," Clark said. "We are convinced that the industry needs a high-speed switch-to-switch link in the gigabit range, and we've been discussing this with a lot of vendors."

But because the alliance has not committed to the idea of pushing a single standard, HP has not yet signed on. ■

McAfee makes power play for Cheyenne

By Ben Heskett
Santa Clara, Calif.

It has all the makings of a daytime talk show episode.

A $1 billion bid made by network management vendor McAfee to purchase LAN storage and backup leader Cheyenne Software, Inc. was made public by Cheyenne last Monday. It then degenerated into a week full of charges and countercharges that continued until press time.

Bill Larson, McAfee's chief executive officer, characterized negotiations to purchase Cheyenne for $27.50 a share as approaching completion, as of Monday. But Cheyenne flatly rejected the proposal and questioned the sustenance of McAfee's stock value.

Each vendor has given different versions of the events that then led to a teleconference held by Larson last week. In that call, Larson chastised Cheyenne CEO ReiJane Huai for his management techniques.

"This is beginning to feel a little bit like all-star wrestling," said John Powers, a financial analyst with Robertson Stephens and Co. who follows McAfee.

As it stands, a lawsuit has been filed by Cheyenne, stemming from Larson's comments. In keeping with the proceedings last week, McAfee deemed the lawsuit "without merit."

Larson has asked for a list of Cheyenne stockholders so he can create an independent negotiating committee, absent Huai. McAfee owns substantial Cheyenne stock, according to Larson, but less than 5%.

Cheyenne has been the subject of acquisition speculation — including a possible purchase by Computer Associates International, Inc. — ever since it reported disappointing third-quarter earnings in February.

McAfee craves Cheyenne's technology and more than a 50% share of the LAN backup and storage market. Cheyenne could make its network management product portfolio more attractive in both the LAN space and the enterprise net space, which it has begun to attack.

Powers said it is difficult for backup and storage management vendors to survive independently as the functionality of the products they offer is increasingly being blended into enterprise management systems. ■

MCAFEE AND CHEYENNE: A GOOD FIT?

Company:	McAfee	Cheyenne
Based:	Santa Clara, Calif.	Roslyn, N.Y.
1995 revenue:	$90 million (calendar year)	$128 million (fiscal year ending June 30)
Primary products:	Saber LAN Workstation management suite, BrightWorks asset management suite, and software distribution, desktop management, backup, help desk and virus detection products.	ARCserve backup tool, InocuLAN antivirus software, FAXserve network fax software, and hierarchical storage management, server backup and inventory products

Two shareholders urge others to jump off the Banyan wagon

By Chris Nerney
Westborough, Mass.

Two Banyan Systems, Inc. stockholders, frustrated by what they call years of marketing and management blunders, have launched a campaign to "send a message" to the floundering company's board of directors at next week's annual meeting.

Mahoney *and his management style come under attack.*

That message, according to William Ifrah and Jerrold Patz, is simple: The company and its shareholders' investments are doomed unless drastic, immediate changes are made.

"Our concern is just straight business," said Patz, senior consultant for CompuCom Systems, Inc. "What offends us the most is that Banyan had such a technological lead 10 years ago and squandered it through classic mismanagement."

Patz and Ifrah posted a letter April 11 on the Internet's Banyan newsgroup and a Compuserve Banyan forum. They say they have contacted hundreds of Banyan shareholders, urging them to think long and hard about the company's direction before voting on the reelection of two board members at the April 29 annual meeting here.

One of those board members is David Mahoney, Banyan's founder, president and chief executive officer.

"Mahoney's been there for 12 years," said Ifrah of Synapse Systems. "If he couldn't do it in 12 years, it's time to move on."

A company spokesperson said, "Shareholders are entitled and encouraged to voice their opinion. However, this letter was written by two out of 10,527 shareholders."

Banyan, once revered for its engineering leadership with its StreetTalk directory service, has seen its technological lead diminish in recent years along with its revenue. Meanwhile, network operating system rivals Novell, Inc. and Microsoft Corp. have become increasingly aggressive.

Banyan watcher David Coursey, the editor of "pcletter" and a longtime critic of Mahoney's leadership, agreed.

"At any time in the recent history of the company, this letter could have been written. These kinds of sentiments were in the Banyan community five years ago," he said. ■

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Banyan blends StreetTalk with 'Net

By Barb Cole

Burlington, Mass.

A Banyan Systems, Inc. division this week will announce plans to integrate Banyan's directory service technology with another company's Internet mail server — a move that may make Internet mail systems easier to scale and manage.

Banyan's StreetTalk directory will show up in Software.com, Inc.'s Post.Office Internet mail server by the third quarter, according to officials from Coordinate.com, Banyan's Internet arm.

The deal links several pieces of the Internet mail puzzle — a Post Office Protocol-compliant client, a Simple Mail Transfer Protocol server and a directory — that analysts said can't be found in one place today.

"All the [mail] vendors, including Lotus and Microsoft, are headed in that direction, though," said Waverly Deutch, an analyst at Forrester Research, Inc. in Cambridge, Mass.

As a result of the product integration, Coordinate.com's BeyondMail and third-party SMTP-compliant mail clients will be able to access the directory service via the Lightweight Directory Access Protocol — a standard for directory services.

The addition of a directory to the mail server will allow intranet users to send and receive mail using public address books that make it easier to locate people and resources on corporate nets, according to John MacFarlane, president and chief executive officer of Software.com.

Currently, the Post.Office server lacks a directory.

In addition, the StreetTalk directory will enable companies to centralize the management of intranet directories across the enterprise, he said.

Post.Office now lets administrators manage changes, moves and adds to end-user electronic mail accounts by filling in Web forms. The addition of StreetTalk means that these changes may now be distributed to every server throughout the enterprise. Software.com sells its mail server to OEM partners, including Netscape Communications Corp., and end users.

Analysts said the deal could give a boost to Banyan, which has been struggling to find new markets for its products.

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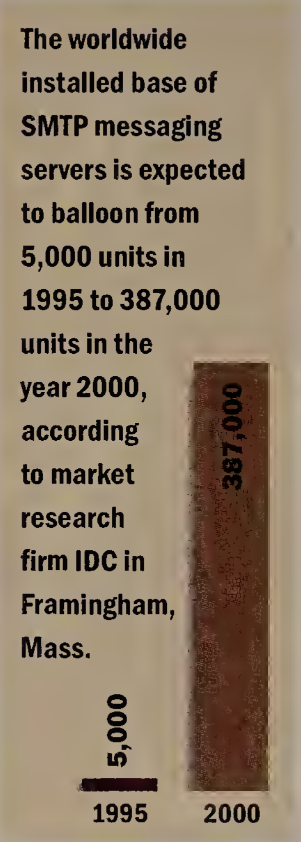

The worldwide installed base of SMTP messaging servers is expected to balloon from 5,000 units in 1995 to 387,000 units in the year 2000, according to market research firm IDC in Framingham, Mass.

Compaq set to roll firewall technology into its servers

By Ben Heskett

Waltham, Mass.

Compaq Computer Corp. last week announced it will partner with Raptor Systems, Inc. to bring Internet security capabilities to Compaq servers.

Though no new products were announced, Compaq is expected to package Raptor's EagleNT firewall products with its ProSignia and ProLiant server lines under an OEM arrangement. Other options include packaging Raptor firewalls in Internet software bundles for electronic commerce applications, among others.

Integration with Compaq software is also on tap, according to Jeff Erramouspe, director of product marketing at Compaq. "You can expect to see integration via [the] SmartStart [CD-ROM software configuration utility] and managability via Insight Manager," he said.

Compaq's *Erramouspe says the company is working on integration.*

Product bundles are likely to be announced in the second half of this year.

Compaq will need to make further inroads with other Internet players, according to Jerry Sheridan, an analyst at Dataquest, Inc., a consultancy in San Jose, Calif. "[Compaq] has probably come late to the dinner table" in the Web-related server space, he said.

Compaq invested $6 million in Raptor prior to the 'Net security company's initial public stock offering in February. Financial terms of the latest deal were not disclosed.■

Java apps will rev higher with Netscape

By Carol Sliwa

Java applications could run five to 10 times faster after Netscape Communications Corp. incorporates Borland International, Inc.'s AppAccelerator technology into its Web browser software.

Netscape last week announced an agreement that will permit it to weave Borland's just-in-time Java compiler into future versions of the Navigator browser. A Netscape spokeswoman predicted integration by the end of the year.

According to one analyst, there's no rush. "As always with Netscape, they're pushing the envelope here," said Ira Machefsky, an industry analyst for the San Jose, Calif.-based Giga Information Group, Inc. "There aren't a lot of people going around pulling out their hair saying, 'Oh my God, my Java applet isn't fast enough.'"

Machefsky, however, noted that Java is prone to the same performance problems as other interpretive languages, and this will become apparent as larger applications come out.

A Borland spokesman said the AppAccelerator sits alongside the Java virtual machine that reads the Java language. When a Java byte code arrives as an applet, the compiler recognizes it is Java code, initializes it and converts it from intermediate byte code to native machine code — in this case, the Intel instruction set.

Currently, the AppAccelerator runs only on Windows NT and Windows 95, but Borland is working to port it to other platforms.■

Security specification is full of holes, critics charge

By Ellen Messmer

The security protocol that Visa and MasterCard have proposed for protecting credit card transactions across the Internet is apparently not invulnerable to criticism.

Last week, security experts roundly condemned the encryption and digital signature specification, calling it "fundamentally flawed."

Security experts claim the Secure Electronic Transactions (SET) standard, expected to be finalized this June, is so poorly designed that merchants should think twice before using it. "SET was a rush job, and it wasn't well thought out," said Bruce Schneier, president of Minneapolis-based consultancy Counterpane Systems.

SET only encrypts the consumer's bank card number, leaving the remainder of a purchase transaction wide open for viewing on the Internet. Consequently, a hacker can recognize a credit card transaction and easily pick out the encrypted bank card and resubmit it as his own, said Aharon Friedman, chairman of security vendor Digital Secured Networks Technology, Inc.

"SET has a lot of merits, but if you take a close look at the standard, you'll see that it's not complete."

Aharon Friedman, Digital Secured Networks Technology

Neither Visa International, Inc. nor MasterCard International, Inc. last week responded to the criticism. But VeriFone, Inc., which plans to build SET-based processing software, acknowledged SET was only a "step in the right direction" and could be improved.

SET does not use full-text encryption because it would require too much processing time, VeriFone said.

John Pescatore, an analyst at the Falls Church, Va.-based IDC Government consultancy, pointed out that another obstacle is the U.S. government, which allows export of software for encrypting credit card information but not the full text of the message.

As part of the SET effort, Visa and MasterCard want to distribute public-key certificates to their cardholders so they can digitally sign their transactions before sending them over the 'Net.

However, issuing and managing a software certificate system for millions of consumers will be a mammoth project. MasterCard is telling merchants they can take SET-based transactions over the 'Net without digital signatures, said David Weisman, director of money and technology strategy at Cambridge, Mass.-based Forrester Research, Inc.

But without the consumer's digital signature, the merchant would take the hit for the fraud, Weisman noted.

The certificate authority servers that Visa and MasterCard will maintain on the 'Net to check merchant and user identity in a credit card transaction present a central point of attack, Friedman said.

Though SET is not officially done, there are plans under way to use it as the foundation for more standards work.

Last week, CommerceNet, a high-tech trade group for electronic commerce, said it will work with the World-Wide Web Consortium at the Massachusetts Institute of Technology Laboratory for Computer Science. The two hope to come up with a standard way that Web clients and servers can negotiate a variety of on-line payment processes such as credit and debit cards, electronic checks, digital cash and micropayments.

The effort, called the Joint Electronic Payments Initiative (JEPI), will involve pilot projects with Cybercash, Inc., the Financial Services Technology Consortium, GC Tech, IBM, Microsoft Corp., Open Market, Inc. and Open Software Foundation, Inc.

Tom Wills, senior program manager for CommerceNet, said SET will be a fundamental part of the JEPI standard for Web payment negotiation, which the group hopes to complete by September.

"SET is insecure in a sense," Wills acknowledged. "The reason they didn't go full blast was to conform to the U.S. export controls on encryption, and to get things done quickly. SET is not the perfect solution, and I expect to see a Version 2 of SET."■

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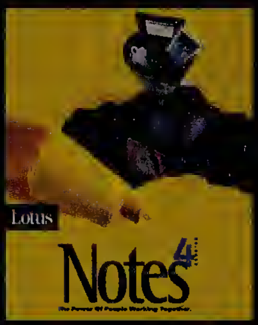

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Circle Reader Service #31

Faxes go over the Internet

By Joanie Wexler
Edison, N.J.

It was only a matter of time until someone figured out they could save money by sending faxes over the Internet.

FaxSav, Inc., an operator of a dedicated worldwide fax network that provides discounts over phone lines, today will announce it has linked to the 'Net. This means users can access the FaxSav network via the Internet rather than using a local exchange carrier or post, telegraph and telephone administration in another country (see graphic).

The FaxSav-Internet linkages will let users in foreign countries faxing to the U.S. bypass the often costly PTT networks — piggybacking the cost on their monthly Internet access charge. FaxSav President Thomas Murawski said his company could save users 80% on faxes to the U.S.

The Internet services will apply to two free software products FaxSav launched today: FaxLauncher, which gives Windows users the ability to fax directly from an application, and FaxMailer, which allows users to convert electronic mail to faxes.

The cost of sending faxes using these applications is a fixed 15 cents per page. Users can download the software from http://www.faxsav.com.

"We're going to try it," said Debby Hood, who has telecommunications responsibility at Air Nevada Airlines, Inc. in Las Vegas.

Faxing accounts for 30% of corporate telecommunications bills in the U.S., according to an annual study conducted by The Gallup Organization and Pitney Bowes Facsimile Systems Division.

But overseas, faxing accounts for 40% to 65% of the bill, said Peter Davidson, president of Davidson Consulting, a Burbank, Calif., firm focused on fax technology and trends.

There could be reliability trade-offs to the cost savings, given the Internet infrastructure, Davidson said.

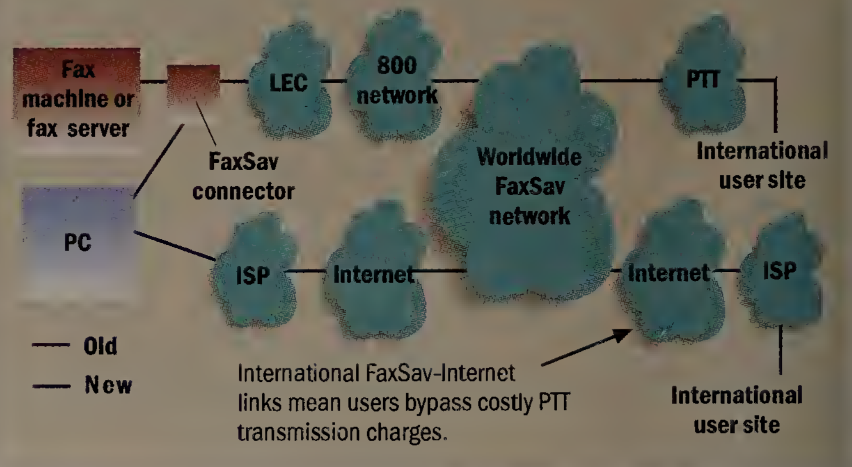
Fax, like voice conversation, has always been sent in real time with a nailed-up connection.

When using a connectionless packet-switching network and store-and-forward technology, users must "be prepared that, like an E-mail, a fax could have large delays" in getting to its destination, he said.

Large corporate users that have already negotiated strong long-distance discounts with their interexchange carriers might not come out ahead with FaxSav, Davidson added. ■

The road less costly

FaxSav's dedicated fax network now links to the Internet for broader reach and more user savings, enabling companies to avoid expensive PTT service prices.



NetCentric to offer fax and net services

By John Dix

If start-up NetCentric Corp. has its way, Internet service providers (ISP) soon will be installing NetCentric platforms to offer fax and other network-based services.

The company's POPware will run on Pentium-based workstations installed at ISP points of presence, making it possible to migrate some typical LAN-based services out into the Internet cloud.

NetCentric's *O'Sullivan says POPware opens up interesting possibilities for ISPs.*

Locating POPware at the juncture of the phone network and the Internet opens up interesting possibilities for ISPs, said Sean O'Sullivan, a founder of the company. For example, while ISPs maintain large modem banks for incoming calls, they are rarely used for outgoing communications. POPware makes it possible to reach out to end users via dial-up links.

Network faxing is one application NetCentric envisions. Customers would dial in to a local ISP POPware server and upload a fax file that would be routed to the POPware server nearest the target destination and then delivered via a dial-up link. Other server-based LAN file services could be hosted in the same fashion.

ISPs also could use POPware to offer services such as software distribution, enabling companies like Netscape Communications Corp. to stage the latest release of its software on POPware servers to facilitate customer access.

O'Sullivan said the Cambridge, Mass.-based company, which has $4.1 million in venture capital will release software supporting fax, file server and other capabilities over the next 12 months, so look for your ISP to be rolling out new wares. ■

ISPs target remote users

By Joanie Wexler
San Jose, Calif.

PSINet, Inc. will launch at Internet World here next week a 'Net offering for remote users that provides access to travel-oriented content and an account administration tool.

The PSINet Remote Access Service, which will cost $1 an hour during prime time on usage plans of 9, 29 and 59 hours, will replace the company's InterRamp for Business offering, according to Marvin Dickerson, PSINet product manager. Information on airlines, hotels, restaurants and directions will be provided by partners to be named at the show.

Customers will also gain an 800 number they can call, for a small fee, when they are more than a local link away from a PSINet point of presence, Dickerson said.

A component to the Remote Access Service is an account management tool that can be used to administer multiple PPP accounts.

The tool is aimed at information systems personnel responsible for managing accounts of users who telecommute or work from far-flung small offices. Through the Web, managers will be able to change or disable passwords, manage electronic mail aliases and monitor usage to help with decision making when upgrading usage plans, Dickerson said.

One analyst said the tool might be ahead of demand. "Internet account management is not as centralized as you might think," said Steve Franco, senior analyst at The Yankee Group in Boston. "Managers are tending to push 'Net account responsibility out to the remote offices."

Meanwhile, PSINet competitor UUNET Technologies, Inc. might announce as early as Internet World roaming dial 'Net access capabilities for international travelers.

The company, which has quietly expanded its infrastructure through acquisitions to include 288 POPs in 13 foreign countries, will soon announce foreign cities from which traveling U.S. users can access the Internet via their UUNET accounts, said Alan Taffel, vice president of sales and marketing. He declined to give further details.

All of the Internet service providers are forging international relationships, said Allen Weiner, an analyst who follows the Internet market at research firm Dataquest, Inc. in San Jose, Calif.

For example, BBN Planet last month announced a partnership with global telecommunications service provider Scitor for pushing its dedicated services worldwide (*NW*, April 1, page 14). ■

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While Intranet Web servers today act mainly as document publishing systems, a number of vendors are now rapidly extending their functionality. For example, Web servers are being integrated with databases, linked to mainframes and other legacy systems, and are providing workflow services. Combined with the high bandwidth capacity of corporate data networks, your organization can capitalize on advanced features such as real-time audio and video as well as collaborative applications and 3-D data representation.

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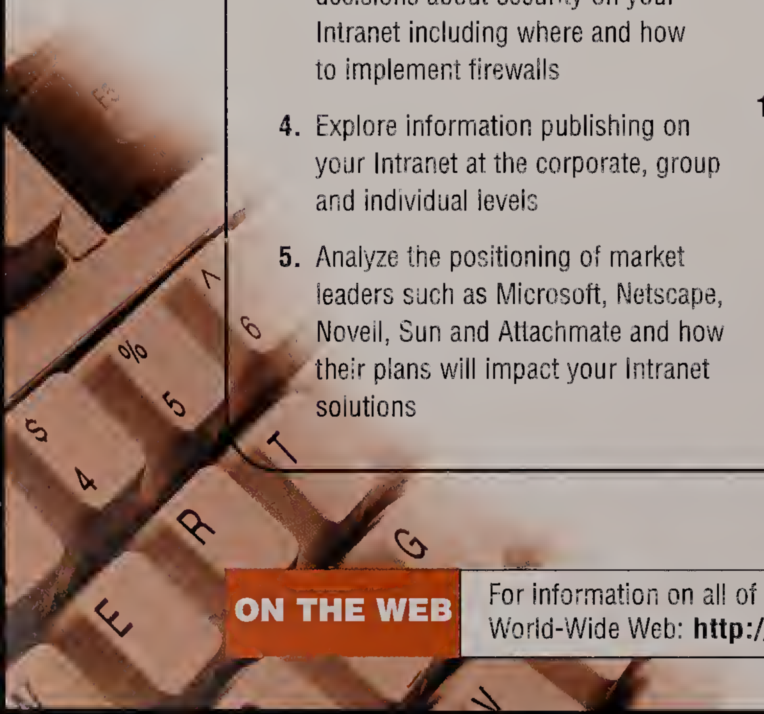

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Seminar OUTLINE

Intranets Redefine IT

At the heart of most Intranet systems are Web servers. These simple but effective information distribution mechanisms are becoming increasingly sophisticated as vendors extend and enhance their basic functionality. Intranets can also involve the use of TCP/IP as a transport and a number of TCP/IP applications that range from file transfer to audio and video distribution.

In this segment, you will learn components of Intranets and build a detailed MIS architecture and management model. We will also quantify the costs and constraints of building an Intranet and discuss the impact an Intranet can have on existing network infrastructures.

We'll cover:

- How the Internet has redefined information publishing
- How an Intranet differs from an Internet presence
- Why Intranets work
- Intranets as groupware solutions and integration strategies with Lotus Notes

CASE STUDIES 1:

Focus on Needs, Costs and Benefits

In our first set of case studies, you will examine a number of end users, including DHL, who have built successful Intranets. We'll discuss the needs that drove their Intranet development and, most importantly, the Return-On-Investment equation for real Intranets.

The Ten Pillars of the Intranet

To help you build your Intranet solution, we will cover the ten key steps of Intranet construction:

1. Planning: Quantifying the needs and wants of the organization in terms of Intranet deliverables
2. Design: Defining the architecture and implementation of Intranet systems
3. Security: Ensuring that the data and processes of your business are protected and their integrity can be assured

4. Data: Planning and implementing access to both existing and new data sources. This includes accessing data external to the Intranet
5. Tools: Identifying the right tools for the job
6. Integration: Planning migration to an Intranet strategy
7. Promotion: Ensuring that the organization understands what the Intranet is for and sees it as a corporate and personal productivity aid
8. Training: Planning and implementing user and technical staff training for Intranet use and development
9. Support: Supporting and servicing your Intranet population
10. Management: Managing and controlling your organization's Intranet

Intranet Technologies

This section breaks down Intranet technologies to build a model of service. We start with the TCP/IP suite and detail the technical aspects of Intranet systems at each layer. Attendees will gain a thorough understanding of the benefits and consequences of each service and how it is implemented in commercial products.

This section will include:

- Transport Layer: High-speed local area access and its impact on Intranet performance and manageability
- Internet and Host Layers: TCP/IP and alternatives
- Application Layer: BOOTP, WINS, FTP, Gopher, News, HTTP
- Foundational Design: Security, integration with existing LAN systems, firewalls, network management, and reporting
- Web Server Backend Services: Common Gateway Interface and variants including: Standard CGI, Microsoft's ISAPI, Netscape's NSAPI, Novell's RCGI

Intranet Tools

In this section we will discuss and demonstrate tools to support user operations and activities including file access, Web browsers, groupware solutions (whiteboards and conferencing), electronic mail and construction tools such as Web servers, Web server extensions, HTML editors and software development toolkits to build the Intranet.

We'll cover:

- Information services: Gopher, IRC, News, Talk, e-mail
- Web clients: Microsoft, Netscape, Spyglass derivatives and other choices
- TCP/IP application suites: Netmanage, Spry, FTP, Frontier
- Application development: Software Development Toolkits for Intranet use including products from Microsoft, Sun and Attachmate
- HTML editors: HotMetal, Frontpage, Blackbird
- Web servers: personal, group and corporate publishing systems based on Novell's Netware Web Server, Attachmate's Host publishing systems, Process Software's Purveyor, Netscape's Communications and Commerce Servers and O'Reilly & Associates Website
- CGI Scripting: Building backend services
- Integration: Linking your Intranet to your corporate information and databases as well as leveraging Lotus Notes
- Publishing: Information services on Intranets and linking them to the outside world
- Emerging tools: Adobe PDF, Shockwave, plug-ins, CU-SeeMe

CASE STUDIES 2:

Strategy and Implementation

In our second set of case studies, we will look at Northern Telecom, Ford and other end users and examine how they built their Intranet solutions.

The Future of Intranets

In this concluding session, we will examine the future of Intranets and take a detailed look at the tools of the future with demonstrations of Sun's Java and Java Script as well as Microsoft's Visual Basic and VB Script and 3-D Data Rendition using Virtual Reality Markup Language.

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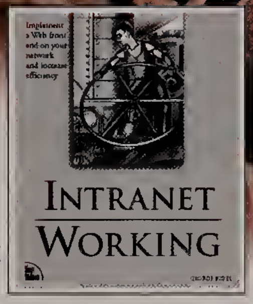

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Note: If you can't attend, call us and order this informative and useful attendee materials kit for just $99.95!

ABOUT THE PRESENTER

For over fifteen years, Mark Gibbs has developed technical and service operations, consulted, lectured and authored articles and books about PCs and networking. His areas of expertise include Internet and Intranet technology, Web design, electronic commerce, technology analysis, strategic planning, collateral development and high-tech marketing.

Gibbs is the author of the best-selling titles *The Absolute Beginner's Guide to Networking* (Sams Publishing, Second Edition 1995), and *Navigating the Internet* (Sams Publishing, 1993 and Deluxe Edition, 1994 and 1995). Gibbs is the editorial director for *Network World*'s supplement, *IntraNet Magazine,* and has had articles published about PC and networking technologies for many periodicals including *Byte, Pen Computing, Inform Magazine* and *Office Computing Report.*

In conjunction with *Network World*, Gibbs has presented seminars to thousands of attendees nationwide including "NetWare 4.x Strategic Migration," "Capitalizing on the Internet," and "Capitalizing on the Web."

Gibbs was co-founder of the UK operation of Novell Inc., where he was responsible for the management of all technical services. He also worked for Novell's Strategic Marketing Group and Novell International. Gibbs is currently the president and principal analyst of Gibbs & Co., a consulting and analysis firm based in Ventura, California.

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SEMINAR TIMES/LOCATIONS

Registration for this seminar will begin at 8:00 a.m. The seminar will begin promptly at 9:00 a.m. and will end at 5:00 p.m. The seminar meeting room will be posted in the hotel lobby. The luncheon room location will be announced at the seminar.

HOTEL

We have reserved a limited number of overnight rooms on an individual call-in basis at each hotel for seminar attendees. If you require a room, please contact the hotel listed on your seminar confirmation form as soon as possible since the rooms are held for a limited time. When calling, please indicate that you will be attending the *Network World Technical Seminar* in order to receive a preferred room rate.

CANCELLATION POLICY

Cancellations must be received in writing at least 10 business days prior to the seminar date in order to receive a full refund. After this date, any cancellation will be subject to a $125 cancellation charge, which may be applied to any future *Network World Technical Seminar.* Any registrant who does not attend a seminar and has not previously canceled will still be liable for the entire seminar fee. You may make an attendee substitution at any time. In the unlikely event that a seminar date must be canceled, Network World, Inc. will be liable for a refund of the seminar fee only.

CONTINUING EDUCATION UNIT (CEU)

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Intranets Seminar Dates & Locations

☐	MAY 30	**ATLANTA, GA** - CROWNE PLAZA RAVINIA	☐	JUNE 27	**MORRISTOWN, NJ** - HEADQUARTERS PLAZA HOTEL
☐	MAY 31	**WASHINGTON, DC** - CRYSTAL GATEWAY MARRIOTT	☐	JUNE 28	**CHICAGO, IL** - ROSEMONT SUITES
☐	JUNE 3	**NEW YORK, NY** - DOUBLETREE GUEST SUITES	☐	JULY 23	**PHILADELPHIA, PA** - DOUBLETREE GUEST SUITES/PLYMOUTH MEETING
☐	JUNE 4	**BOSTON, MA** - ROYAL SONESTA	☐	JULY 25	**DALLAS, TX** - TO BE ANNOUNCED
☐	JUNE 11	**IRVINE, CA** - RADISSON PLAZA HOTEL	☐	AUGUST 5	**DENVER, CO** - TO BE ANNOUNCED
☐	JUNE 18	**SEATTLE, WA** - SHERATON SEATTLE	☐	AUGUST 7	**MINNEAPOLIS, MN** - TO BE ANNOUNCED
☐	JUNE 19	**SAN FRANCISCO, CA** - ANA HOTEL	☐	AUGUST 8	**CINCINNATI, OH** - TO BE ANNOUNCED

▶ METHOD OF PAYMENT (PAYMENT IS DUE PRIOR TO SEMINAR DATE) ▶

COURSE FEE

Course fee includes seminar, course materials, luncheon and morning and afternoon refreshments.

Intranets: Technologies, Tools & Strategies

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NW-TIP

WANs & Internetworking

Covering: Network Architectures and Management • Routers • Muxes, Remote Access Gear, Modems, PBXs and other CPE • Mobile Computing Products

Briefs

■ **Motorola, Inc.** *last week rolled out* **ISDN enhancements** *for its X.25 switches and additional voice capabilities for its router.*

The 650-D products are ISDN terminal adapters combined with an X.25 packet assembler/disassembler. They are designed for retailers that require packetized data transactions for credit card or check approvals.

Two models are available, priced at $599 and $649.

Motorola also unveiled a new release of its 6520 router that combines voice and data applications over a single frame relay circuit.

Pricing for the router, available this month, starts at $1,195.

Motorola: (508) 261-4000.

■ **SBE, Inc.** *rolled out an integrated* **remote access** *product that features an Ethernet hub, router and remote access server for less than $600.*

The Netxpand Routeman system features a four-port Ethernet hub, an IP and IPX router, analog and ISDN connectivity, and support for the PPP and Multilink PPP protocols. ISDN connectivity is provided by Nippon Telegraph and Telephone Corp.'s ThunderCard DD1280, which sports a single Basic Rate Interface in a PC Card form factor.

Netxpand Routeman costs $599, while ThunderCard DD1280 costs $399. Both proucts will be available in May.

SBE: (800) 925-2666.

■ **Compuware Corp.** *last week said its EcoTools* **applications management** *software is now integrated with Hewlett-Packard Co.'s OpenView and Oracle Corp.'s Enterprise Manager software.*

Pricing for EcoTools starts at $23,000.

Compuware: (313) 737-7300.

■ *Computer Associates, Inc.'s* **CA-UniCenter** *and its object database technology, called* **Jasmine,** *will debut as an integrated object-based systems management and database at CA World in August.*

Cisco goes with the flow

Firm introduces a scheme for higher performance routing.

By Jim Duffy
San Jose, Calif.

Cisco Systems, Inc. last week unveiled software that should allow its backbone routers to stave off incursions from switches for a while.

The new software, called NetFlow, provides users with an alternative to switched Asynchronous Transfer Mode. Like ATM, NetFlow provides a connection-oriented mode of data transmission; but unlike ATM, NetFlow works with packets and requires no change to the traffic or to any other networking device, according to Cisco.

Conventional routing operates in connectionless mode, whereby a virtual circuit does not have to be defined for data transfer. In this approach, each packet associated with a data flow is individually examined by the router to determine its path, priority, access privileges and origin. These tasks rely on network layer and user address information, and each task impacts system performance.

NetFlow, meanwhile, uses transport layer information to establish a connection-oriented virtual circuit, identify the application session and attach the appropriate service requirements to the data flow.

With NetFlow, only the first packet of a data stream is processed. This information is then

See **Cisco,** *page 20*

IBM, Microsoft server wars move uptown

By Michael Cooney

If it's possible to have two winners in a war, IBM and Microsoft Corp. could be the ones to do it in the enterprise server arena.

In its quest to conquer new worlds, Microsoft has launched a not-so-quiet offensive into IBM's Application System/400 mid-range territory.

As IBM's lucrative AS/400 family shifts to the Reduced Instruction Set Computing-based environment, many competitors see an opportunity to make some inroads. But none of these competitors strikes fear into Big Blue's heart, though, like Microsoft and its Windows NT and BackOffice products.

Microsoft's *Suomalainen advises users to see how the AS/400 performs before deploying it.*

Vesa Suomalainen, general manager of Microsoft's SNA Server product line, said Microsoft is not interested in replacing AS/400s with Windows NT servers and its SNA Server gateway, which is part of BackOffice. Instead, the company wants to work with existing AS/400 users to help offload application and network processing.

But IBM is not buying that strategy and believes Microsoft is trying to squeeze into a market that is potentially ripe for the picking. "Microsoft is in something like 75% of our AS/400 shops as clients, so it's not too hard to see that they're after the server for those boxes," said Tony Madden, IBM's AS/400 technical executive.

IBM has been trying to reshape the AS/400s image in the past few years into a true server platform. The key to the new AS/400 now lies in the 64-bit PowerPC chip, which, in some configurations, promises a 300% performance improvement over existing non-RISC AS/400s. Another important aspect is an onboard 80486-based File Server I/O Processor (FSIOP) that now

See **Server wars,** *page 20*

NetworkWorld Fusion

Link to Network World Fusion to download dueling SNA white papers from IBM andMicrosoft. (http://www.nwfusion.com). Select News+, then WANs & Internetworking.

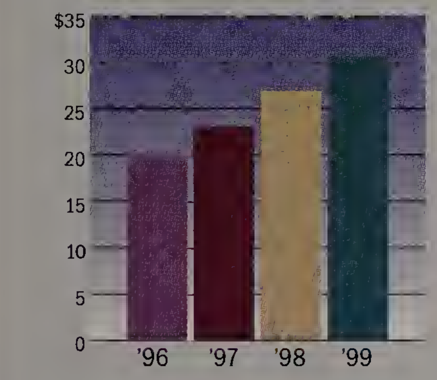
Another place to outsource everything

By Tim Greene
Exton, Pa.

Users trying to get rid of networking problems by hiring an outsourcer have a new option: XLConnect.

OUTSOURCING BOOM

U.S. network integration and support market (in billions)



Average annual compound growth: 15.5%

SOURCE: DATA QUEST WORLDWIDE SERVICES, WESTBOROUGH, MASS.

The firm, which has 1,000 technicians in the field and 26 locations nationwide, is the result of a merger of two Intelligent Electronics, Inc. subsidiaries.

One of the subsidiaries, IntelliCom Solutions, Inc., was a reseller and provisioner of frame relay, ISDN, and other services and equipment. The other subsidiary, the professional services group within The Future Now, specialized in network monitoring, maintenance and the like.

"XLConnect is fairly unique. They offer network management, products, transport, skilled resources and a national presence," said Traci Bair, an analyst at International Data Corp. in Framingham, Mass.

The firm can provide consulting, equipment selection and installation, voice and data telecommunications connections, Internet access and applications development, including electronic mail and electronic commerce.

The company offers services similar to those offered by Bell Atlantic Network Integration, Ameritech Corp. and US WEST's Interprise group. These carriers offer national service but, unlike XLConnect, are still thought of as regional entities, Bair said.

Tom Sweeney, an analyst at Dataquest, Inc. in Westborough, Mass., said the company would also compete against the likes of Anixter, Inc.

The firm's menu includes designing nets, lining up hardware, installing and provisioning equipment, and monitoring and maintaining systems. XLConnect also will order and provision telecommunications services, including voice and data, as well as 'Net access, he said. And it can handle help desk and billing.

Bair said that with a lengthy list of reseller affiliates, users will not feel that they are wed to a single hardware or service vendor but that they can deal with a single source if they choose.

Richard Ellenberger, XLConnect's chief executive officer, said he saw opportunities for his company to partner with the regional Bell operating companies to help them deliver their network integration services.

XLConnect has relationships with the RBOCs for ISDN and frame relay, and with MCI Communications Corp. for long distance. Ellenberger is the former president of MCI's business sales and services. XLConnect's partners also include Compaq Computer Corp., Hewlett-Packard Co., IBM, Intel Corp., Motorola, Inc.,3Com Corp., Bay Networks, Inc., Gandalf Technologies, Inc., Network Express, Inc., Novell, Inc., U.S. Robotics, CompuServe, Inc., MCI, Lotus Development Corp. and PSINet, Inc.

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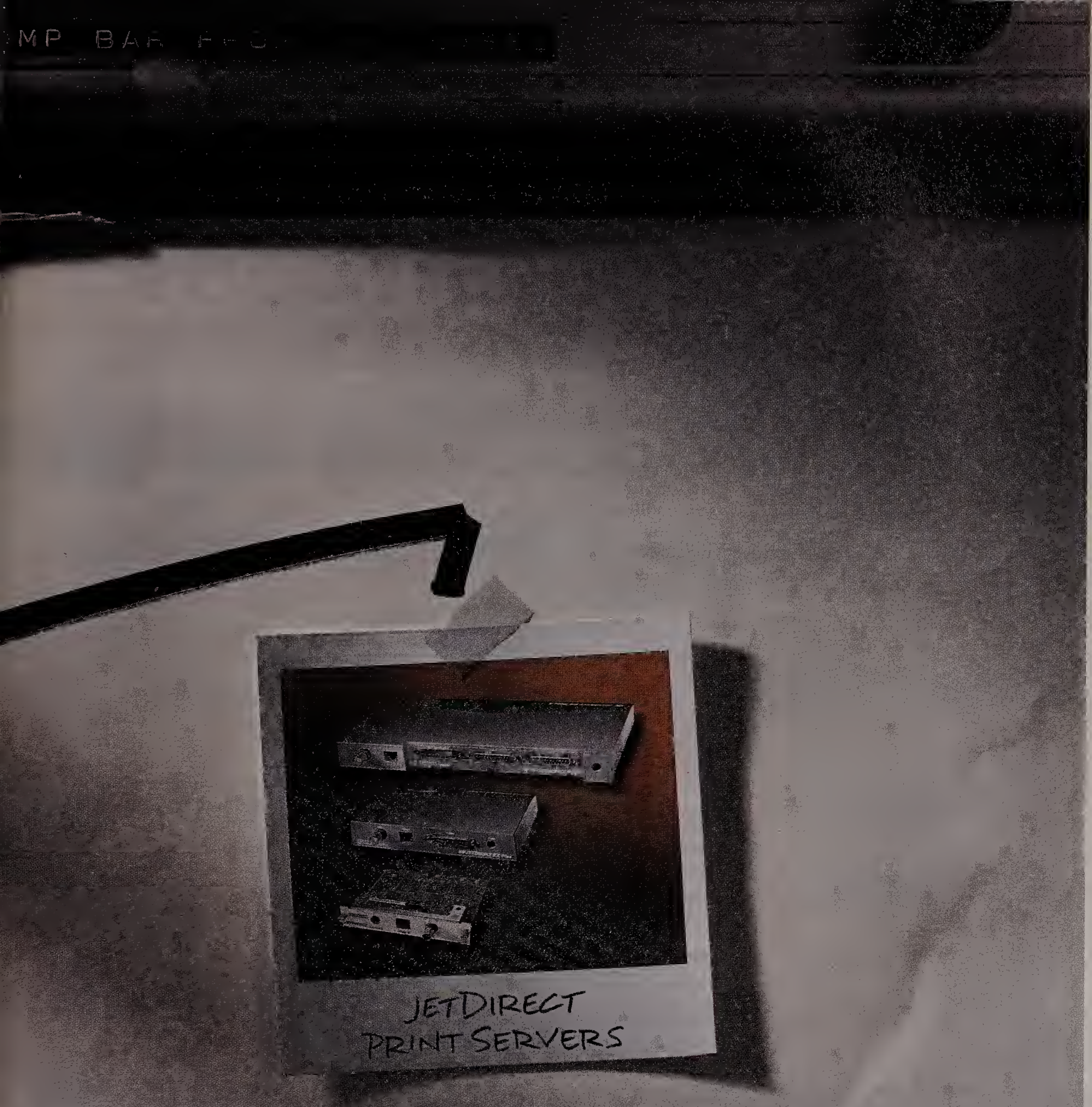

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Server wars

Continued from page 17

supports NetWare Loadable Modules and Lotus Notes. This Intel Corp. board effectively turns the AS/400 into a big Notes and NetWare server.

The FSIOP could be a bigger tactical weapon for IBM, as the company is reportedly working on porting Windows NT to the FSIOP, letting it serve Windows nets.

IBM also has a new 5250 HTML gateway in the works for June that will let users run existing AS/400 applications on the 'Net without any changes, Madden said.

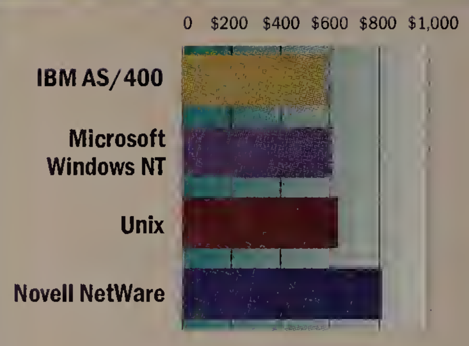
One of the tacks Microsoft is taking is that the AS/400 does not perform well in an environment of networked clients, citing a March Tolly Group test.

The Tolly Group, an independent testing lab in Manasquan, N.J., tested SNA Server, IBM's AnyNet client program and Wall Data, Inc.'s Rumba client products. The tests showed that SNA Server improved network response times by 47% over AnyNet and sent 32% less frame traffic over the net than the IBM product. It also showed that SNA Server used 10% less of the AS/400's CPU to do the work.

The test did not sit well with many observers, however. "If Microsoft is going to compare SNA Server to AS/400 connectivity software, it should do an apples-to-apples comparison," said Anura Guruge, an independent analyst based in New Ipswich, N.H. "A performance comparison with AnyNet is ridiculous because IBM doesn't position that technology as a screamer in any sense of the word."

But Microsoft stands by the test. "AnyNet is IBM's strategic way of getting the AS/400 in multiprotocol environments, and users should know how it performs before they deploy it," Suomalainen said. ■

Small business's monthly systems bill



Numbers represent costs for 15 users over a five-year period and include application development, networking, operations, software and hardware.

SOURCE: IDC, FRAMINGHAM, MASS.

BusinessBriefs

Cabletron Systems, Inc. has landed its largest net management sale to date, with KE Kommunikations Elektronik GmbH & Co. of Hannover, Germany.

Under the multimillion-dollar transaction, KE will deploy more than 4,000 servers running Cabletron's **Spectrum network management** software to manage a fiber-based telecommunications infrastructure serving over one million subscribers.

Cisco Systems, Inc. will distribute Coordinate.com's BeyondMail **electronic mail software** as a component of its CiscoRemote Plus remote node/remote control software.

Cisco will ship CiscoRemote Plus 2.0 with the BeyondMail Standard Edition software later this month. Coordinate.com is the Internet division of Banyan Systems, Inc.

Cisco

Continued from page 17

cached and applied to each subsequent packet in the data flow. The end result is higher performance cut-through routing, in which the router applies transmission services and collects traffic statistics via one task instead of four.

"It extends the capabilities and performance of the investments the Cisco customers have made in their networking infrastructures," said Kimberly Lorencic, senior analyst at The Yankee Group in Boston.

Users say they can benefit from NetFlow's traffic statistic collection capability.

"Right now, we don't have a very good way of accounting who's connecting to where and why without taking a terrible performance hit on our routers," said Erikas Napjus, manager of network development for computing services at Carnegie-Mellon University in Pittsburgh. "It's nice to see them addressing that issue with NetFlow."

Competitively, NetFlow is going up against the IP switching technology recently introduced by start-up Ipsilon Networks, Inc. (*NW*, March 4, page 1).

NetFlow costs $5,000 and will be available later this quarter.

Meanwhile, Cisco rolled out a new generation of Versatile Interface Processor (VIP) modules for its 7500 and 7000 routers that more than double performance and port density. The new modules, for example, let the performance of a 7500 scale from 500,000 packet/sec to more than one million packet/sec. The model 7513 router also can support up to 176 Ethernet ports from a previous limit of 66.

The new VIPs range in price from $8,000 to $18,000 and will be available in the third quarter.

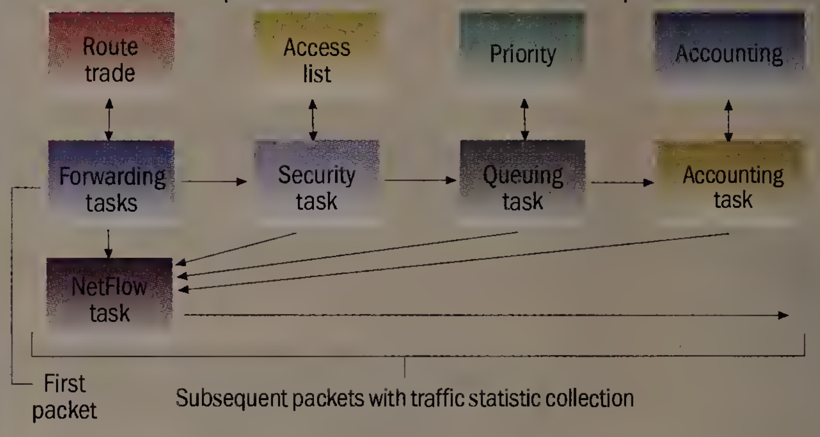
Lastly, Cisco's new packetized Synchronous Optical Network (SONET) interface lets users forward packets and frames at 155M bit/sec — a speed usually associated with ATM cell transfer. The interface ranges in price from $22,000 to $30,000 and will be available in the third quarter.

©Cisco: (408) 526-4000.

IN THE FLOW

NetFlow routing

- Only first packet processed by multiple tasks.
- Connection-oriented, with visibility into transport layer.
- Network service requirements added and statistics collected per flow.



SOURCE: CISCO, SAN JOSE, CALIF.

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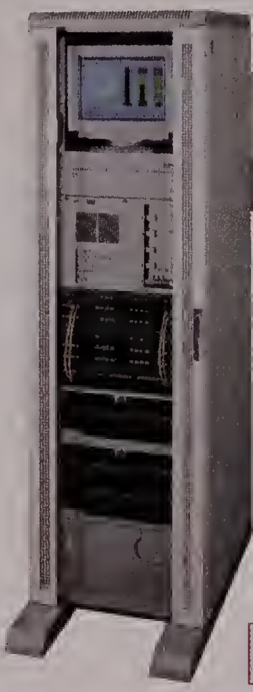

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APC's Measure-UPS prevents data or hardware damage by monitoring temperature, humidity, physical access and other external sensors. When alarm conditions occur, Measure-UPS along with APC software or hardware accessories can alert you and initiate a safe system shutdown. Moreover, network management nightmares like unauthorized access can be easily monitored with our Measure-UPS switch kit for NetShelter door openings.

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Smart-UPS RM rack-mount UPS provides performance power management for advanced networks

The ideal uninterruptible power supply (UPS) for rack mounted file servers, hubs, routers, telecommunications systems and other mission-critical equipment within NetShelter.

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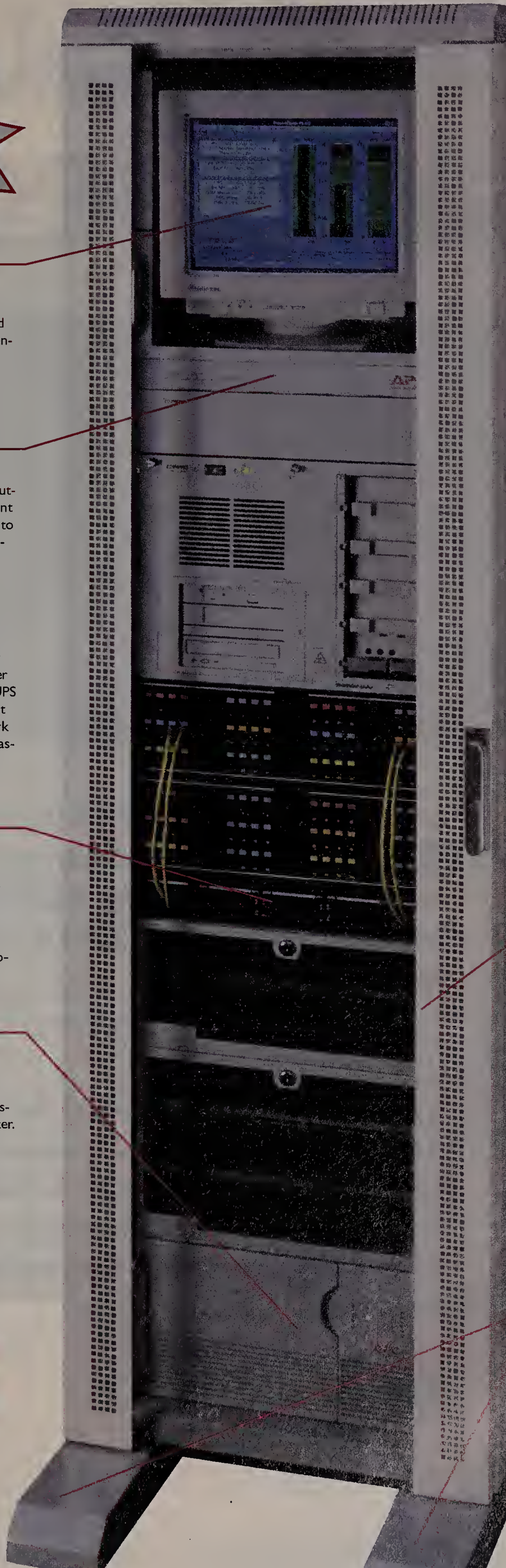

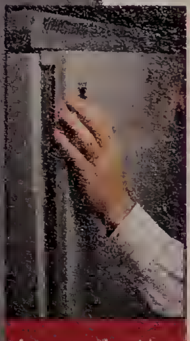

Access to the sides of the cabinet for equipment installation and service is provided quickly by simply unlatching the locking side panels

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“Your online version of *Network World* is **fabulous.** The articles are timely and informative, and your design is **stellar.** The hyperlinks and story links are a great idea. Well done!”

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University of Michigan

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—Gary Von Erden
Cable & Wireless, Inc.

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MIT Lincoln Laboratory

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Briefs

▪ **AT&T and Sony Electronics, Inc.** *last week showed video compression and multiplexing technologies they will use to eventually deliver* **high picture-quality digital services** *for the broadcast industry.*

The compression will reportedly allow two high-quality programs to run over a 45M bit/sec link to an AT&T server from which the carrier will offer access to video images and data to broadcasters.

▪ *The Microsoft Corp.-Craig McCaw low-earth orbit satellite venture,* **Teledesic Corp.,** *has hired Hans-Werner Braun as chief network architect. Braun led the development of the first Internet backbone in 1988 and, most recently, was the principal scientist for the San Diego Supercomputer Center, where he led a National Science Foundation-funded project to relieve Internet congestion.*

Teledesic aims to blanket the earth with **several hundred satellites** *to deliver broadband network links everywhere.*

▪ *The* **MSAT-1 satellite,** *which was scheduled for launch Saturday, completes a Canada-U.S.* **mobile network** *that provides total coverage for services across both countries plus 200 miles of coastal waters. The satellite is owned and run by TMI Communications and Company, Ltd. of Ottawa, and American Mobile Satellite Corp. in Reston, Va.*

▪ *Internet service provider* **Apex Global Information Services, Inc.** *will install Cascade Communications Corp. B-STDX 9000 multiservice switches and* **Cascade 500 Asynchronous Transfer Mode switches** *in its network.*

▪ **Winstar Communications, Inc.** *last week announced that Century Telephone Enterprises, Inc. will use Winstar's* **Wireless Fiber service** *to deliver wireless T-1 services for supporting Internet access, frame relay, long-distance and Centrex services. Century provides local phone service in 14 states.*

MasterCard buys into frame relay

By David Rohde

Washington, D.C.

MasterCard International, Inc. later this year will begin building what is likely to be one of the world's largest frame relay networks.

But rather than simply run it over AT&T's InterSpan frame relay network, the global payment services company has assigned the engineering, customer premises equipment (CPE) maintenance and end-to-end network management to AT&T Solutions, the carrier's customer network management division.

MasterCard's new global network will consist of thousands of frame relay nodes in the U.S. and a combination of frame relay and private-line connections in 30 other countries, said Sam Patel, solutions architect for AT&T Solutions.

With construction beginning in September, the new network will replace an X.25 network based on older Bolt Beranek and Newman, Inc. packet data switches. "It's a very reliable, cost-effective network," said Artie Ahrens, MasterCard's senior vice president of operations services in St. Louis. "But we are constrained through the proprietariness of the nodes."

The X.25 architecture also imposes a speed limit of 56K bit/sec on the traffic, Ahrens added. Although transaction processing is typically thought of as requiring low-speed links, MasterCard processes literally hundreds of credit and debit card transactions a second.

Ups and downs are another issue. Particularly during the Christmas shopping season, MasterCard encounters bursty traffic patterns. Ahrens said he was looking for a WAN architecture that allows bursts of traffic for heavy transaction periods, with daily cash settlement and statistical traffic reserved for slower periods.

The company also has a data warehouse, but users such as member banks were forced to access it over carrier dial-up links rather than the private X.25 network.

Don't call it outsourcing

Ahrens balked at the suggestion that the new arrangement is an outsourcing deal. Rather, the contract calls for network management and support to be delivered through AT&T Solutions' new $40 million Global Client Support Center in Durham, N.C. (see graphic), with eventual links to similar regional centers in Singapore and Amsterdam.

MasterCard will retain control of the applications, but the contract enables the company to get out of the business of managing a global private network that continually had new demands placed on it.

"I just kept building a bigger and bigger network," Ahrens said.

The new client support center in Durham is open continuously and has full disaster recovery backup processing with uninterruptible power supply. Every workstation is wired for two voice jacks and two Ethernet LAN jacks. And the center supports Hewlett-Packard Co.'s OpenView, in line with AT&T's 1994 decision to build its One-Vision network management strategy around that platform. ■

Another North Carolina coup

Facts about AT&T Solutions' first Global Client Support Center:

Opened:	April 6, 1996
Location:	Durham, N.C.
Size:	70,000 sq. ft.
Staff:	Up to 560 people
Number of additional centers planned:	Five

SOURCE: AT&T SOLUTIONS, WASHINGTON, D.C.

Optical fiber and coaxial cable is the future for SNET

By Tim Greene

Hartford, Conn.

With users demanding more bandwidth, Southern New England Telephone Co. (SNET) has responded with a $4.5 billion, 14-year project to swap out its copper network for one made of optical fiber and coaxial cable.

SNET's new net

The change:	Copper to fiber/coaxial cable
The scope:	Connecticut
The cost:	$4.5 billion
Timetable:	Phased in by 2009
Benefits:	Faster provisioning, easier upkeep

The SNET fiber/coaxial network for the state of Connecticut makes SNET the largest local exchange carrier to commit to such an architecture.

In the process, SNET is taking on a few risks. There is no model to follow, and the technology, particularly the cable modems that could make broadband services virtually ubiquitous, are still developing.

But SNET said the network — dubbed the I-SNET — will give users what they want and, at the same time, relieve many network management and maintenance headaches.

"We came to the realization a long time ago that we needed to completely overhaul the network in order to remain competitive and to be able to offer new services faster," said Hoshang Mulla, vice president in charge of the I-SNET buildout.

The promise for users is faster turn-up times for new services, especially broadband services, because of the richness of high-capacity fiber throughout the network.

Scheduled for completion in 2009, SNET plans to replace one wire center at a time — starting with one in Stamford, Conn., this year — converting line by line, Mulla said. Even as that work is going on, SNET is working with equipment vendors as it refines its needs.

For SNET, the network will be easier and more efficient to manage because there are fewer physical lines of which to keep track. And much service provisioning can be done through programming switches, rather than sending technicians out to configure lines.

"The focus in a copper network is on labor and splicing that goes with physically managing the network outside, but there is also a lot of work maintaining, inventorying and keeping accurate records of where your network is and what is connected to what," Mulla said.

In a fiber-coaxial net, "the numbers of fiber and coaxial cables involved are orders of magnitude less than you are dealing with in copper pairs. A few hundred fibers leaving a central office could more than adequately carry the same capacity of several hundred thousand pairs of wires," Mulla said.

Fiber will stretch to nodes that each feed clusters of about 200 homes with coaxial cable, Mulla said. Most corporate users would have direct fiber feeds, meaning more available bandwidth and easier provisioning.

Smaller businesses and homes could access broadband services via cable modems but not for a couple of years, Mulla said. The modems are reaching maturity this year, and SNET will offer them as it identifies those that are stable and reliable, he added.

None so bold

Other carriers embrace fiber-coax nets, but not as strongly as SNET. Pacific Bell had plans to build out a similar net by 2010, but that schedule has been scrapped because getting approval for upgrades was more difficult than anticipated.

US WEST, Inc., in its merger with Continental Cablevision, Inc. is rebuilding Continental's cable TV network for telephony services, which is major work on a net designed for downstream-only broadcast transmissions.

Other regional Bell operating companies are indulging in limited trials of fiber-coaxial nets, in some cases only to support cable television services. ■

Switches

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COMPAQ Has It Changed Your Life Yet?

WAN MONITOR

Oh, what a tangled Web we weave

The World-Wide Web has become the mecca of advertisers and a new cornerstone for marketing communications. The idea is fantastic: Make it fast and easy for customers to get information about your company and products. You may even be able to take orders over the Web.

There is one small problem, however. You might build a great home page, but the number of visitors is directly related to the size of your front door. You could be throwing a lot of money down the drain as well as missing new revenue opportunities unless you plan for this critical aspect of Web connectivity.

Firms are spending between $60,000 and $2 million to create their Web pages. This figure sounds staggering to many, but the initial development cost is just the beginning. Someone has to be responsible for keeping the Web site updated, and this can be a full-time job for one or more people. Most firms will spend between $60,000 and $450,000 just keeping a mid-size Web site updated and current.

Russ McGuire, manager of advanced technologies at WilTel Internet Services (www.wiltel.net), said the relationship between the number of hits and the size of the access depends on the type of page.

A typical text-only Web page is 50K bytes. Given this assumption, a 56K bit/sec connection into the Web site would support 10,000 hits a day if you factor in the overhead imposed by TCP/IP. A DS1 connection would support 280,000 hits, and a DS3 would support eight million.

Adding voice or video has a big impact. A relatively large audio file of 800K bytes means that a 56K bit/sec link could support 650 hits a day, a DS1 about 17,000 and a DS3 around 500,000.

Video is much worse. A large video clip of 3M bytes means that the 56K bit/sec access link would only support 167 hits, a DS1 would support 4000, and a DS3 would support 130,000.

As firms add audio and video servers to the mix, the impact is major, and obvious.

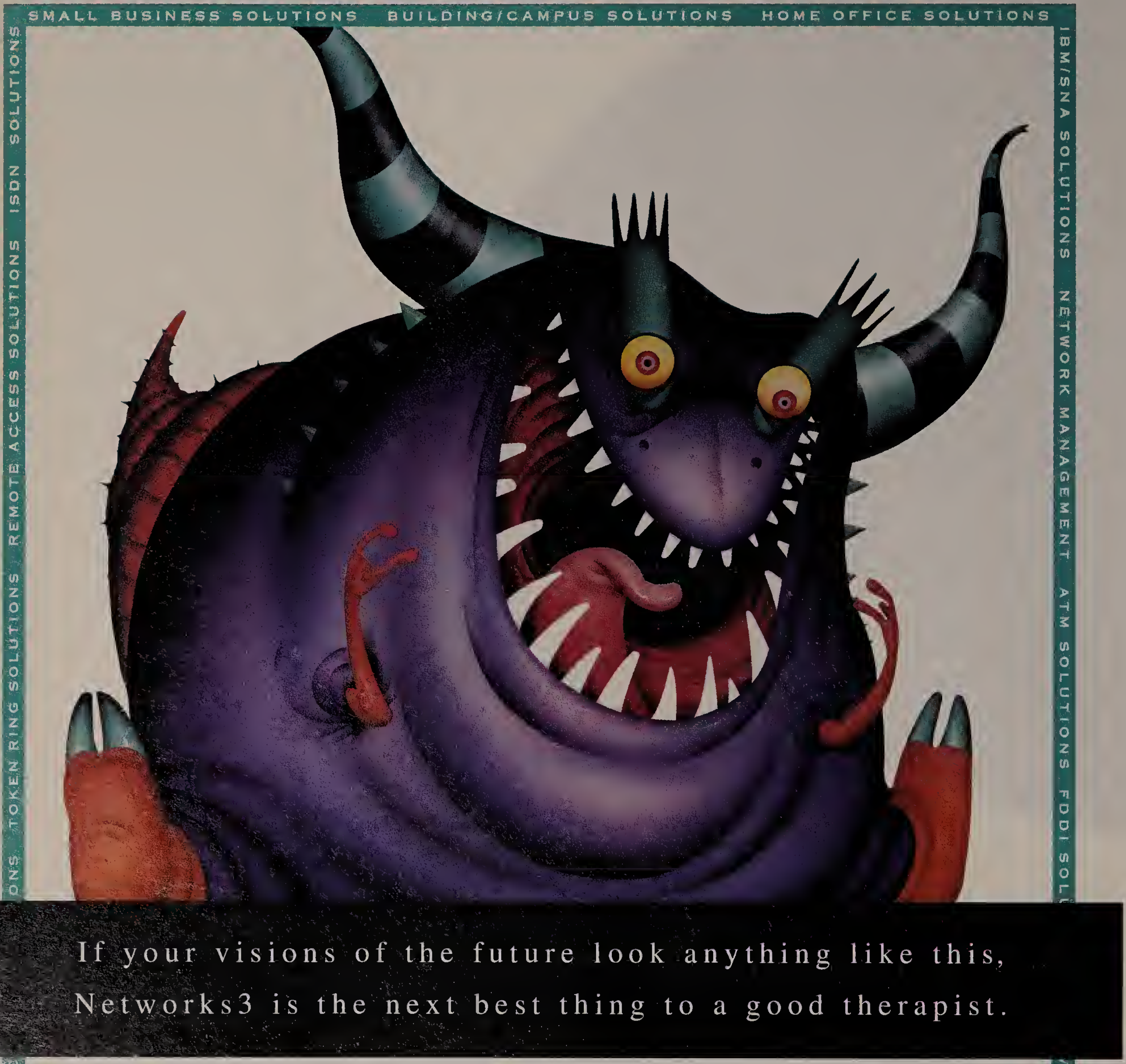
Daniel Briere and Christine Heckart

McGuire stresses that there are two competing uses for Internet connectivity. Employee access to the Internet competes for the bandwidth on the access link with people trying to access your Web site for information. One of the reasons why many companies are turning to outside hosting companies is not just to outsource the creation and maintenance of the site, but also so that they don't have to use their own Internet bandwidth to support the site.

A 56K bit/sec local loop costs about $150 to $250 per month, while a DS1 local loop runs about $600 to $800 a month, and a DS3 costs between $3000 and $4000 per month. Of course, this price varies depending on where you are in the U.S. and the length of the access circuit. There are other alternatives, such as SMDS or frame relay services, but these will only make sense if you have several locations that will be using the data service in addition to the site hosting the Web server.

One of the major factors of a successful Web site will be adequate access speed. If prospective customers try the site a few times and it is busy, they will probably take their business elsewhere. The cost justification should be driven by the reduction in personnel needed to handle phone-based orders or requests as well as by the increased business that is generated. If this isn't the case, why be on the Web in the first place?

Briere is president and Heckart is director of broadband with TeleChoice, Inc., a consultancy in Verona, N.J. They can be reached at danny_briere@telechoice.com or christine_heckart@telechoice.com.



Put your fears about the future of networking to rest at the premier event of this season: Networks3. Taking place this June 3rd – 6th at the Westin Hotel in Santa Clara, the event will provide key insights into future technologies as well as opportunities to exchange ideas with peers and learn how to integrate new technologies.

Along with renowned industry speakers, the event will feature thirty-two different networking workshops as well as a Technology Solutions Lab, where network design consultants will demonstrate customized solutions to tough network challenges.

The cost of attendance is $395 per person. But if you register before May 3, you'll save $100. For more event information or to register, call **1-800-746-2185**. Or reference our web site at http://www.3com.com

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THE NEWSWEEKLY OF ENTERPRISE NETWORK COMPUTING

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1 Industry: (check one only)

01. ☐ Manufacturers (other)
02. ☐ Finance/Banking
03. ☐ Insurance/Real Estate/Legal
04. ☐ Health Care Services
05. ☐ Hospitality/Entertainment/Recreation
06. ☐ Media/TV/Cable/Radio/Print
07. ☐ Retail/Wholesale Trade/Business Services
08. ☐ Transportation
09. ☐ Utilities
10. ☐ Education
11. ☐ Process Industries (Mining/Construction/ Petroleum Refining/Agriculture/Forestry)
12. ☐ Government (Federal/State/Local)
13. ☐ Military
14. ☐ Aerospace
15. ☐ Consultants (Independent)
16. ☐ Carriers/Interconnects
17. ☐ Manufacturers (Computer/Communications)
18. ☐ Resellers of Computer/Network Products (VARs, VADs, Distributors)
19. ☐ Systems/Network Integrators
20. ☐ Distributors (Computer/Communications)
21. ☐ Other *(please specify)*______________

2 What is your job function? (check one only)

NETWORK IS MANAGEMENT:

1. ☐ Networking Management
2. ☐ LAN Management
3. ☐ Datacom/Telecom Management
4. ☐ IS, IT, MIS, Systems Management
5. ☐ Engineering Management
6. ☐ Corporate Management (CIO, CEO, Pres., VP, Dir., Mgr., Financial Management)
7. ☐ Consultant (Independent)
8. ☐ Other *(please specify)*______________

3 What is the total number of sites for which you have purchase influence? (check one only)

1. ☐ 100+
2. ☐ 50 - 99
3. ☐ 20 - 49
4. ☐ 10 - 19
5. ☐ 2 - 9
6. ☐ 1
7. ☐ None

4 What is your scope and involvement in purchasing decisions for network products & services for your enterprise?

A. SCOPE (check one only)
1. ☐ Corporate/Enterprise
2. ☐ Department
3. ☐ None

B. INVOLVEMENT (check all that apply)
1. ☐ Recommend/Specify
2. ☐ Approve
3. ☐ Evaluate
4. ☐ Determine the need
5. ☐ None

5 Check ALL that apply in Columns A and B:

A. I am involved in the purchase of the following products/services:
B. I plan to purchase the following products/services:

A B
☐ 100 ☐ **LOCAL-AREA NETWORKS**
☐ 01. ☐ Local-Area Networks
☐ 02. ☐ Network Op. Sys. Software
☐ 03. ☐ LAN Storage/Backup
☐ 04. ☐ Optical LAN Storage/Backup
☐ 05. ☐ Disk LAN Storage/Backup
☐ 06. ☐ Tape LAN Storage/Backup
☐ 07. ☐ RAID LAN Storage/Backup
☐ 08. ☐ Network Test/Diagnostic Tools
☐ 09. ☐ Cables, Connectors, Baluns
☐ 10. ☐ UPS
☐ 11. ☐ Network Interface Cards
☐ 12. ☐ Peer-to-Peer LANs
☐ 13. ☐ SNMP Network Management
☐ 14. ☐ ATM Switches
☐ 15. ☐ Token-Ring Switches
☐ 16. ☐ Ethernet Switches
☐ 17. ☐ Remote LAN Access/Communications Servers
☐ 18. ☐ Superservers
☐ 19. ☐ File/Application Servers
☐ 20. ☐ Print Servers

A B
☐ 101 ☐ **INTERNETWORKING**
☐ 21. ☐ Bridges
☐ 22. ☐ Routers
☐ 23. ☐ Bridge/Router
☐ 24. ☐ Gateways
☐ 25. ☐ Intelligent Hubs/Stackables

A B
☐ 102 ☐ **COMPUTERS/PERIPHERALS**
☐ 26. ☐ Laptops/Notebooks/Sub-Notebooks
☐ 27. ☐ Micros/PCs
☐ 28. ☐ Minis
☐ 29. ☐ Mainframes
☐ 30. ☐ Workstations
☐ 31. ☐ Terminals
☐ 32. ☐ Printers
☐ 33. ☐ Cluster Controllers
☐ 34. ☐ Monitors
☐ 35. ☐ Fax/Modem Boards

A B
☐ 103 ☐ **REMOTE/WIRELESS COMPUTING**
☐ 36. ☐ PDAs
☐ 37. ☐ PCMCIA Devices
☐ 38. ☐ Wireless Data Services
☐ 39. ☐ Wireless Data Equipment
☐ 40. ☐ Wireless LANs
☐ 41. ☐ Cellular Equipment & Services

A B
☐ 104 ☐ **INTERNET/ELECTRONIC COMMERCE**
☐ 42. ☐ Internet Access Providers
☐ 43. ☐ Firewalls
☐ 44. ☐ Web Servers/Brnwsers
☐ 45. ☐ Internet Software Tools

A B
☐ 105 ☐ **SOFTWARE/APPLICATIONS**
☐ 46. ☐ Network Management
☐ 47. ☐ Systems Management
☐ 48. ☐ Security
☐ 49. ☐ Communications Software
☐ 50. ☐ Terminal Emulation
☐ 51. ☐ Word Processing
☐ 52. ☐ Operating Systems
☐ 53. ☐ Client/Server Applications Development
☐ 54. ☐ Database Management/RDBMS
☐ 55. ☐ Spreadsheet
☐ 56. ☐ Groupware
☐ 57. ☐ EDI
☐ 58. ☐ E-mail
☐ 59. ☐ Windows/Graphical User Interface
☐ 60. ☐ Multimedia
☐ 61. ☐ Graphics/DTP
☐ 62. ☐ Remote Access
☐ 63. ☐ Imaging
☐ 64. ☐ Suites
☐ 65. ☐ Middleware
☐ 66. ☐ Document Management
☐ 67. ☐ Database Server
☐ 68. ☐ Site Metering Tools
☐ 69. ☐ Computer-Integrated Telephony (CIT)

A B
☐ 106 ☐ **WIDE-AREA NETWORK EQUIPMENT & SERVICES**
☐ 70. ☐ Frame Relay Equip./Services
☐ 71. ☐ Modems
☐ 72. ☐ FT-1/T-1/T-3 Multiplexers
☐ 73. ☐ FT-1/T-1/T-3 Services
☐ 74. ☐ SONET
☐ 75. ☐ Inverse Multiplexers
☐ 76. ☐ SMDS
☐ 77. ☐ Asynchronous Transfer Mode
☐ 78. ☐ Diagnostic/Test Equipment
☐ 79. ☐ DSU/CSU
☐ 80. ☐ VSAT/Satellite
☐ 81. ☐ ISDN Equipment & Services
☐ 82. ☐ PBXs
☐ 83. ☐ Voice Mail/Response
☐ 84. ☐ Videoconferencing
☐ 85. ☐ Leased Lines
☐ 86. ☐ Switched Data
☐ 87. ☐ E-mail/On-line Services
☐ 88. ☐ 800/900/MTS Services
☐ 89. ☐ Virtual Networks
☐ 90. ☐ Outsourcing/Systems Integratinn Services
☐ 91. ☐ Education/Training Services

☐ 92. ☐ None of the above (1-91)

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6 What is the total number of LANs, workstations/nodes at this location/ in your organization?

At this location:

	LANs		Workstations/ Nodes
1.	☐	5,000+	☐
2.	☐	1,000 - 4,999	☐
3.	☐	100 - 999	☐
4.	☐	50 - 99	☐
5.	☐	10 - 49	☐
6.	☐	1 - 9	☐

Entire organization:

	LANs		Workstations/ Nodes
1.	☐	5,000+	☐
2.	☐	1,000 - 4,999	☐
3.	☐	100 - 999	☐
4.	☐	50 - 99	☐
5.	☐	10 - 49	☐
6.	☐	1 - 9	☐

7 Check ALL that apply in Columns A and B:

A. The following network platforms are currently installed:
B. The following network platforms are planned for purchase:

A B
☐ 55 ☐ **NETWORK ARCHITECTURES**
☐ 01. ☐ SNA
☐ 02. ☐ DECnet
☐ 03. ☐ TCP/IP
☐ 04. ☐ Novell IPX/SPX
☐ 05. ☐ APPC/APPN/LU 6.2
☐ 06. ☐ NETBIOS
☐ 07. ☐ AppleTalk
☐ 08. ☐ NFS
☐ 09. ☐ Otber *(please specify)*______________

A B
☐ 56 ☐ **NETWORK OPERATING SYSTEM**
☐ 10. ☐ Microsoft (LAN Manager)
☐ 11. ☐ Novell (NetWare 2.X, 3.X)
☐ 12. ☐ Novell (NetWare 4.X)
☐ 13. ☐ Windows NT
☐ 14. ☐ Windows NT/Advanced Server
☐ 15. ☐ LocalTalk (AppleTalk)
☐ 16. ☐ Banyan (VINES)
☐ 17. ☐ IBM (LAN Server)
☐ 18. ☐ IBM (PC LAN Program)
☐ 19. ☐ Artisoft (LANtastic)
☐ 20. ☐ Digital (Pathworks)
☐ 21. ☐ Otber *(please specify)*______________

A B
☐ 57 ☐ **LAN ENVIRONMENT**
☐ 22. ☐ 4M Token Ring
☐ 23. ☐ 16M Token Ring
☐ 24. ☐ Ethernet
☐ 25. ☐ 100M Ethernet
☐ 26. ☐ StarLAN
☐ 27. ☐ FDDI
☐ 28. ☐ LocalTalk
☐ 29. ☐ 10Base-T
☐ 30. ☐ ATM
☐ 31. ☐ Other *(please specify)*______________

A B
☐ 58 ☐ **COMPUTER OPERATING SYSTEM**
☐ 32. ☐ DOS
☐ 33. ☐ Unix/Xenix/AIX
☐ 34. ☐ OS/2
☐ 35. ☐ OS/2 Warp
☐ 36. ☐ IBM MVS
☐ 37. ☐ IBM VM
☐ 38. ☐ Digital VMS
☐ 39. ☐ Macintosh
☐ 40. ☐ Windows
☐ 41. ☐ Windows 95
☐ 42. ☐ X Window System
☐ 43. ☐ Solaris
☐ 44. ☐ Other *(please specify)*______________

☐ 45. ☐ None of the above (1-44)

8 For which areas outside of North America do you have purchase influence? (check all that apply)

1. ☐ Europe
2. ☐ Asia
3. ☐ South America
4. ☐ Australia
5. ☐ Middle East
6. ☐ None

9 Do you have or plan to install client/server networks? ☐ Yes ☐ No

10 Which of the following hardware platforms are installed/planned in your company? (check all that apply)

Mainframes	A – Installed	B – Planned
1. IBM	☐	☐
2. Amdahl	☐	☐
3. Cray	☐	☐
4. Hitachi	☐	☐
5. Unisys	☐	☐

Minis	C – Installed	D – Planned
1. IBM	☐	☐
2. Digital	☐	☐
3. Tandem	☐	☐
4. Unisys	☐	☐
5. AT&T GIS	☐	☐
6. HP	☐	☐
7. Data General	☐	☐

Which of the following do you have installed/planned: (USE NUMBERS ONLY)

	At this location:		Entire organization:	
	E – Servers	F – Clients/Nodes	G – Servers	H – Clients/Nodes
1. Power PC				
2. Power Macintosh				
3. Macintosh (Other)				
4. Pentium-based				
5. 80486-based				
6. 80386-based				
7. 80286-based				
8. RISC-based workstations				
9. Other				

11 What is the estimated value of networking equipment and services that you help specify, recommend or approve annually? (check one only)

01. ☐ $100 million or more
02. ☐ $50 million - $99.9 million
03. ☐ $25 million - $49.9 million
04. ☐ $20 million - $24.9 million
05. ☐ $10 million - $19.9 million
06. ☐ $5 million - $9.9 million
07. ☐ $1 million - $4.9 million
08. ☐ $500,000 - $999,999
09. ☐ $250,000 - $499,999
10. ☐ $249,999 or less
11. ☐ None of the above

12 Estimated gross annual revenue of your entire company/institution: (check one only)

1. ☐ $10 billion or more
2. ☐ $1 hillion to $9.9 billion
3. ☐ $500 million to $999.9 million
4. ☐ $100 million to $499.9 million
5. ☐ $50 million to $99.9 million
6. ☐ $10 million to $49.9 million
7. ☐ $5 million to $9.9 million
8. ☐ $4.9 million or less
9. ☐ None of the above

13 Estimated number of employees at this location/in entire organization:

At this location:
1. ☐ Over 10,000
2. ☐ 5,000 - 9,999
3. ☐ 2,500 - 4,999
4. ☐ 1,000 - 2,499
5. ☐ 500 - 999
6. ☐ 499 or less

Entire organization:
1. ☐ Over 10,000
2. ☐ 5,000 - 9,999
3. ☐ 2,500 - 4,999
4. ☐ 1,000 - 2,499
5. ☐ 500 - 999
6. ☐ 499 or less

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Briefs

■ **Fibronics International, Inc.,** *based in North Billerica, Mass., has rolled out a trio of* **high-speed switching modules** *for the company's flagship 12-slot GigaHub LAN switching hub. Fibronics unveiled a 12-port 100Base-T switch card, which allows as many as 144 Fast Ethernet connections in a single chassis.*

The company also rolled out a 36-port Ethernet switch module that increases the GigaHub's Ethernet port density to 432 ports. For Asynchronous Transfer Mode connectivity, Fibronics announced an ATM access card that provides a 155M bit/sec ATM port to link to an ATM switch. All of the products will be available by the end of the summer.

Pricing has currently not been set.

Fibronics: (508) 671-9440.

■ **Efficient Networks, Inc.,** *based in Dallas, recently rolled out a* **25M bit/sec Asynchronous Transfer Mode adapter** *that features a hardware implementation of the available bit rate (ABR) traffic management capability. The ATM Forum's Traffic Management 4.0 specification, which includes the ABR standard, is expected to be finalized this month.*

*Other adapters that do not support ABR via hardware will require software upgrades, and some may even have to be swapped out for new cards (*NW, *Dec. 18, 1995, page 1).*

Efficient's card is priced at $249 and will be available in June.

Efficient: (214) 991-3884.

■ *Fremont, Calif.-based* **Garrett Communications, Inc.** *last week announced a stand-alone* **Fast Ethernet workgroup hub** *that provides 100M bit/sec links to power users or servers. The Magnum 40E has four 100M bit/sec ports and provides front-panel LEDs that indicate basic network activity.*

The Magnum 40E hub is priced at $895 and is currently available.

Garrett: (510) 438-9071.

Microsoft, Novell butt heads in net mgmt. arena

By Terra Friedrichs

Network management might not be the first thing you think about when choosing a network operating system, but it should be a priority given the resources NOS vendors are putting into their LAN management tools.

Both Microsoft Corp. and Novell, Inc. are trying to lure new customers with their respective net management offerings, Systems Management Server (SMS) and ManageWise. The packages are similar but have several differences.

SMS is a comprehensive tool for managing desktop software and hardware, but it relies on third-party tools to manage the network.

ManageWise manages virtually all aspects of the network, but it is missing some useful tools for managing desktops.

Microsoft continues to promise integrated network management functionality for SMS. Although the company has yet to deliver, suitable workarounds appear to be enough to keep customers happy.

For instance, longtime Microsoft NOS customer Turner Broadcasting Sales, Inc. has installed several network management tools purchased from Microsoft partners that supplement SMS. Although the tools were not integrated by Microsoft, Turner is happy with the arrangement and feels it has what it needs to manage the company's large network.

Others prefer the simplicity of deploying an integrated system. ManageWise's desktop management software and its network management support tools are packaged together. This makes it easy for the customer to buy and install a complete management system. The bundle also supports NetWare Directory Services, which allows managers to administer user rights from one location.

File compression

NetWare is reportedly better at compressing files, but the combination of SMS and Windows NT provides an ease of use that is important for managers responsible for large or frequent software deployments.

A special feature of the SMS compression tool allows network managers to define which network links require data compression, enabling files to be compressed and decompressed for distribution even during off-hours.

SMS also allows the distribution of software by segment. By sending pieces of the application software and checking for correct transmission, only failed seg-

See **Net mgmt.,** *page 33*

Pricing summary

	SMS	ManageWise*
Price per server	$650	$795-$12,995
Price per client	$55	Included in server price, but software distribution adds $15 to $40 per client.
5 users	$275, plus $650 per server	$795
100 users	Volume discounts; see value-added reseller	$3,995
1,000 users	Volume discounts; see VAR	$12,995
Discounts	See VAR	See VAR; often 20% to 30% off list price
Upgrade prices	Client upgrade from 1.0 is free; server upgrade is 25% to 30% of original price.	Client upgrade from 1.0 is free; server upgrade is $400.

*Includes software distribution

SOURCE: PRODUCT MANAGEMENT ASSOCIATES, ACTON, MASS.

Seagate backs up Oracle databases, Exchange servers

By Ben Heskett

Orlando, Fla.

Seagate Software Storage Management Group has announced its first application-specific agent software, enabling customers to manage the backup and storage of Oracle Corp.'s databases and Microsoft Corp.'s Exchange Server across LANs.

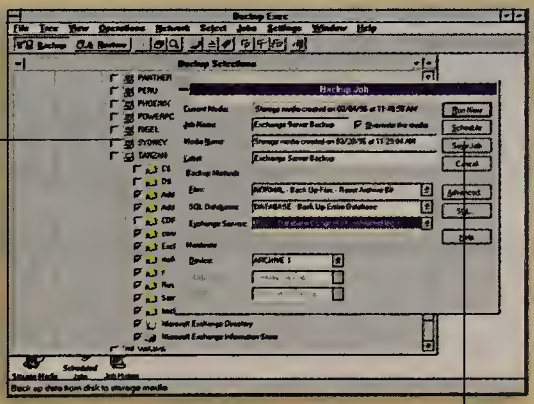
The agents are designed to work in conjunction with Seagate's core backup and storage management products, including Backup Director, Storage Manager and Backup Exec for Windows NT products.

Seagate officials said they are mulling the development of backup agents for other popular applications and databases such as SAP AG R/3, Oracle for Unix, and Informix Software, Inc. and Sybase, Inc. databases.

The new agents, which reside on both a backup server and a database or messaging server, can be controlled via a central console. The agents can be used

See **Seagate,** *page 36*

SEAGATE'S EXCHANGE BACKUP PLAN



With the Microsoft Exchange agent for Backup Exec for Windows NT, administrators can back up particular elements of the software, such as the Exchange directory.

Exchange backups can be arranged via a detailed scheduling window.

Cogent hopes to make its name in gigabit Ethernet

By Jodi Cohen

Friday Harbor, Wash.

Cogent Data Technologies, Inc. likes the idea of extending Ethernet to gigabit speeds but doesn't want to wait for the creation of a new IEEE standard to offer the pumped-up products.

So Cogent is developing its own technology based on the existing IEEE 802.3u Fast Ethernet standard that will provide customers with 10 times the bandwidth of existing 100M bit/sec gear by year-end.

Competitors 3Com Corp., Compaq Computer Corp. and Sun Microsystems, Inc. are proposing a gigabit Ethernet standard that, if approved, will yield products in about two or three years (*NW,* Dec. 18, 1995, page 1). While Cogent is evaluating this approach, the company will move forward with its own gigabit Ethernet technology to bring

See **Cogent,** *page 36*

COGENT'S GIGABIT SCALABLE FAST ETHERNET

- ▶ Based on the IEEE 802.3u Fast Ethernet standard.
- ▶ Supports Category 5 unshielded twisted-pair copper and multimode fiber wiring.
- ▶ Utilizes Fast Ethernet parallel multiplexed channels to achieve 1G bit/sec data rates.
- ▶ Targeted at high-speed workgroup market.
- ▶ Products expected to ship by year-end.

WIRED WINDOWS

Dave Kearns

Clustering could make your Windows network sturdier

Clustered computers have been with us for some time, ever since Digital Equipment Corp. introduced the VAX cluster many years ago.

Last fall, however, clustering got a little more interesting for LAN administrators. Compaq Computer Corp., Tandem Computers, Inc. and Microsoft Corp. announced an initiative to develop a common API for clustering.

Last week, Microsoft announced that the next version of its SQL Server database and NT Server would support the first implementation of this clustering technology, Compaq's server failover system. This calls for two computers to be connected to a single disk source — normally a RAID system of some type for fault tolerance — so that in the event one server has a hardware failure, the second can take over.

Microsoft's announcement is news not because what the firm has announced is revolutionary, but because it means that the company is starting to take the needs of net administrators more seriously.

Downtime is one of the major causes of job displacement (i.e., losing your job) among network administrators.

We all know, though, that hardware fails and software has bugs. These are facts of life that we must be prepared to deal with quickly and effectively. Redundant systems are the best protection from these failures, and redundant systems that kick in automatically give us the time needed to replace the faulty parts of the network.

Compaq, Tandem and Microsoft hope to build on the Compaq failover product to create what Compaq calls an Array of Industry Standard Servers — that is, a server cluster. But I'm not sure the two technologies have that much in common.

Tip of the week

20/20 Software is currently shipping NET-install, a Netscape plug-in, to facilitate software and data distribution over the Internet or intranets. There's a 30-day evaluation copy available from http://www.twenty.com/.

Here's an example: You have two assistants, both relatively equal in their capabilities. In a redundant system, you'd give both the same project to do. Either one would do the work while the other watched, or both would do the work in the same order, stopping periodically to make sure they were at the same place on the time line. Should one get sick, the other could complete the project without needing to take time to get up to speed.

In a clustered system, you, as master controller, would give each assistant parts of the project to complete. You'd ensure that the results of one part were in before they were needed for another part. The two assistants might be aware of each other's progress, but should one get sick, the other could not take on the whole project and finish it at the same speed.

While there are some similarities in the two approaches, the clustered approach requires a lot more work to implement. Some have projected that clustering in the LAN will be available before the end of 1999. While I think that's a bit optimistic and wouldn't start planning my server cluster yet, the availability of greater redundancy for NT servers is worth some planning time. It may be the best reason for moving to NT Server 4.0 this fall, at least for NT Server 3.5 or 3.51 sites.

Kearns, a former network administrator, is a freelance writer and consultant in Austin, Texas. He can be reached at dkearns@msn.com.

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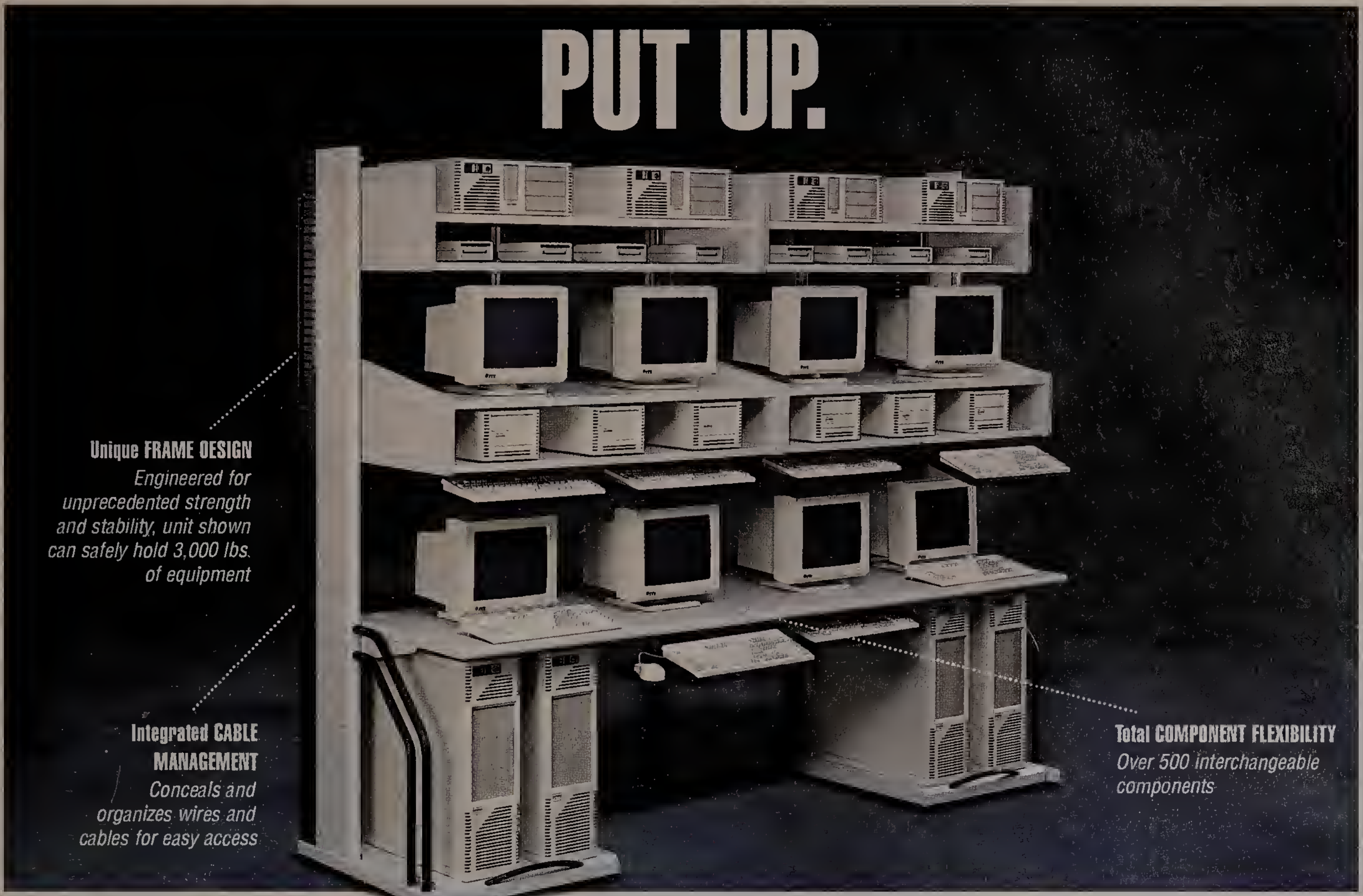
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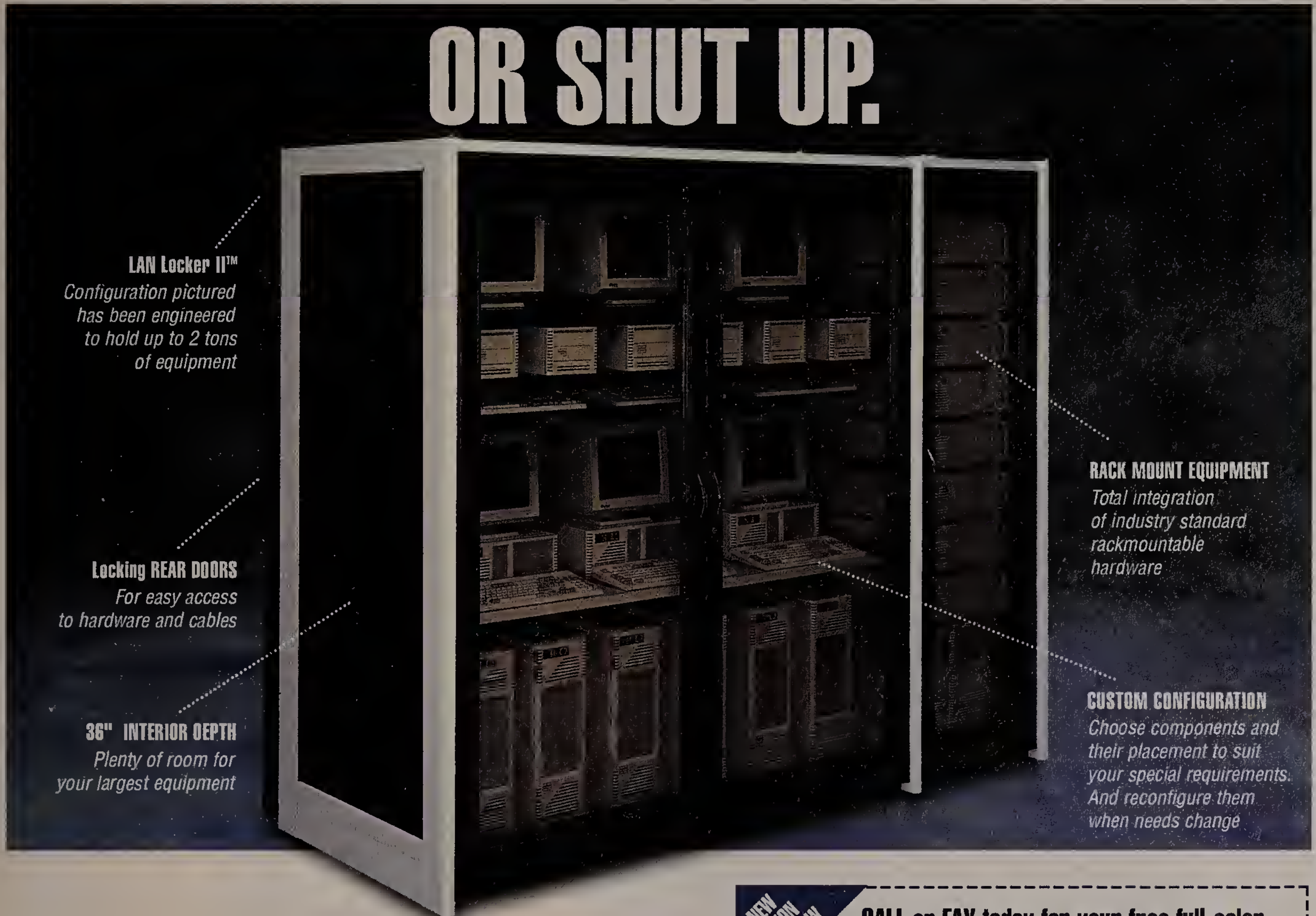
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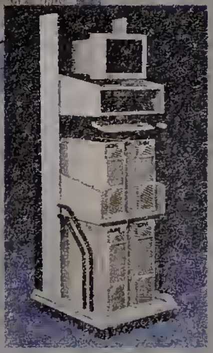

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NET RESULTS

Getting your arms around network downtime

Skip MacAskill and Melinda Le Baron

We're all familiar with the benefits that networks can bring to a business, enabling your organization to develop and deliver products or services faster and more efficiently. But how many of us know what kind of financial strain the LAN places on our annual budgets?

A portion of that answer is pretty straightforward. You can easily put figures to things such as salaries for LAN support folks, capital outlay for equipment and maintenance contracts for hardware and software.

But how do you put a figure on something more intangible, like network downtime? On the whole, the cost of downtime is subjective, with its primary impact being on transaction volume and end-user access requirements.

Unfortunately, these categories vary according to LAN, hour and business unit, which makes the task of defining downtime costs both time-consuming and difficult.

Gartner has devised a downtime cost analysis model that focuses on a LAN with 150 clients and two servers — one for applications and one for office services. But this model is designed to accommodate all sizes of LANs.

The simplest measurement of downtime is based on equipment and software failure. And while most companies do not have detailed records of uptime percentages, generalized figures can be used for planning.

For this model, we assume that a LAN averages 97% availability in a given year and only has to be running 12 hours a day, five days a week.

This gives us an expected downtime of 93.6 hours per year. Since our environment has two servers, the maximum expected downtime is 187.2 hours. With 150 users on this LAN, the maximum total loss in person hours is 28,080 hours per year.

The second major component is the cost of these person hours. Let's assume an average salary of $37,000 per employee on the LAN, with a loaded cost factor of 40% to cover benefits and services provided by the company. That makes the average compensation package $51,800 or $25.90 per hour for each employee (or client) on the server.

Now if we want to cost-justify anything, we just multiply the downtime total by the hourly rate for a truly staggering number. However, to create a more realistic number, we can factor in the time an employee uses the LAN for real work.

In this example, we use a production server that needs to be accessed 30% of the time. Factoring this number into the equation gives us a total downtime cost of $209,790.

Remember, this total has nothing to do with transaction loss, loss of business or customer dissatisfaction. In addition, it does not take into account service loss for data recovery or technical support costs.

Companies also should consider including the likelihood of client machine failures into their equations.

Most companies severely underestimate the cost of LAN downtime. By using cost models similar to ours, users can gain a better understanding of what is at risk from a financial and network perspective, and make better decisions about how to build LANs and choose products.

Le Baron is a research director and MacAskill a senior research analyst in Gartner Group, Inc.'s Network Computing Infrastructure group. They can be reached by E-mail at inquiry@gartner.com or by phone at (203) 316-1111.

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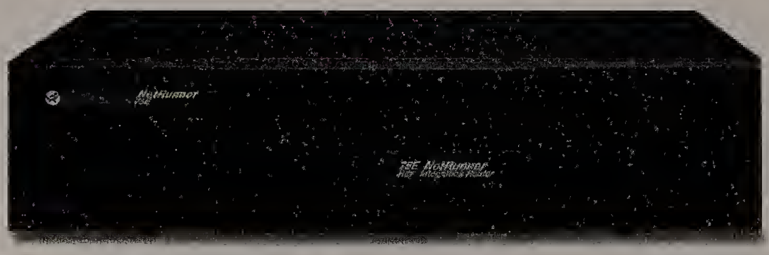

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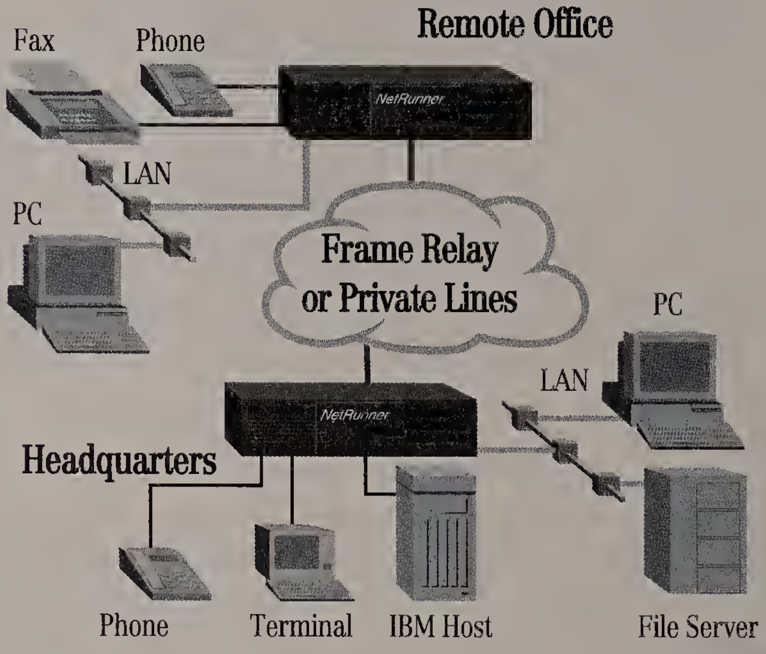

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Net mgmt.

Continued from page 27

ments are retransmitted. This can significantly cut down on network traffic.

Remote diagnosis

One of the most valuable features of both packages is the ability to remotely diagnose problems with end-user desktops and applications. The ability to capture what's on a user's computer screen, so both the manager and the user are looking at the same thing, is critical to an administrator's ability to provide end-user support.

Marty Lantz, a systems manager and ManageWise user at Johnson Controls, Inc., said, "I've saved so much leg work [because of this feature], I've put on weight."

ManageWise provides a comprehensive protocol analysis capability for the NetWare protocol family, AppleTalk, TCP/IP, Network File System, SNA and others, as well as a Simple Network Management Protocol analysis capability. In addition, it is Remote Monitoring-compliant.

SMS provides a protocol analysis capability, but not RMON compliance. Version 1.2 will have some SNMP analysis tools.

Fault detection and management

Both packages are outfitted with fault detection and alarms.

ManageWise, however, has several advantages over SMS in these areas. First, it can be used to monitor and report on the more than 400 standard SNMP fault conditions. According to Robert Anderson, network administrator at retailer Ann Sacks Tile & Stone, these capabilities are simple to use thanks to a single screen where users can point and click to change commands.

Secondly, ManageWise is good at transferring fault information to any SNMP console.

SMS can send and receive alarm information to various element managers, but its ability to work with higher end Unix-based platforms is limited.

Virus protection

ManageWise has a built-in virus scanner for remote end users. SMS lacks the feature, but third-party packages are available from companies such as Intel Corp. and McAfee for a few hundred dollars.

Reportedly, NetWare does not support as many dial-up users as does Windows NT without significant hardware add-ons. The lack of support for remote users may be a virus deterrent in itself.

License auditing, application metering

Another key feature for desktop management is the ability for the system to keep track of how many users have installed or are accessing applications.

Both ManageWise and SMS can calculate the total number of software packages installed by autodetecting more than 5,000 software packages. Using application metering, a company can enforce application licensing agreements.

Pricing comparison

ManageWise pricing is all-inclusive with the exception of compression and a few features, such as sending software segment by segment. The software is priced based on incremental numbers of users, making calculation easy but irritating some customers that have an odd number of users. SMS is priced separately by server and client. But the software lacks management tools that may need to be acquired from third-party vendors for hundreds of dollars more.

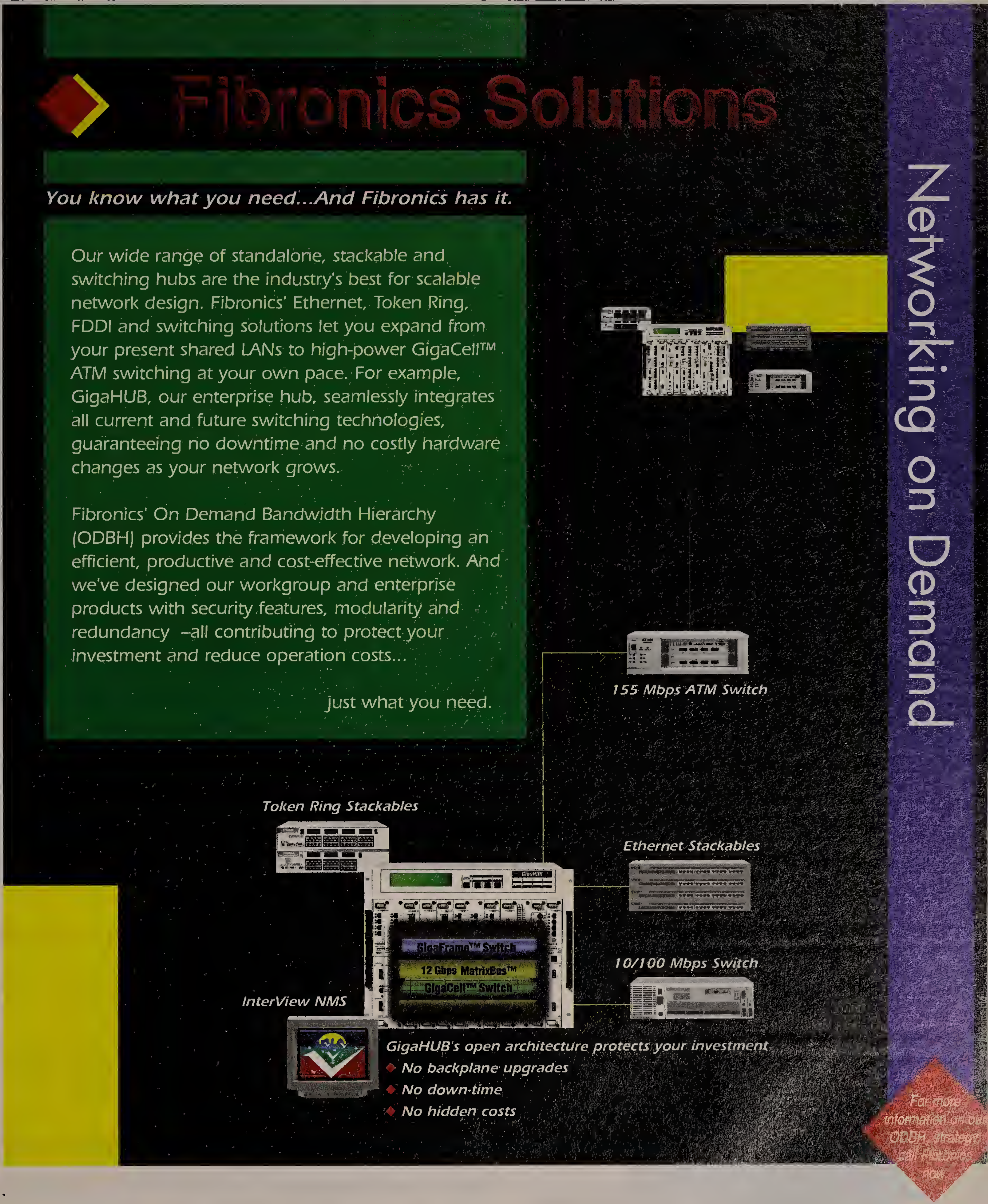
Support

Both companies offer technical support for their software 24 hours a day, seven days a week.

Novell limits its support to the telephone. On-site support for ManageWise is available through value-added resellers.

Microsoft offers phone support and offers to dispatch technicians to a customer's site for a cost of $190 per hour (plus travel expenses) through the Microsoft Consulting Group.

Friedrichs is a marketing consultant based in Acton, Mass. Her company, Product Management Associates, specializes in market research for companies providing networking products and services. She can be reached at (508) 266-2778.



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Fibronics

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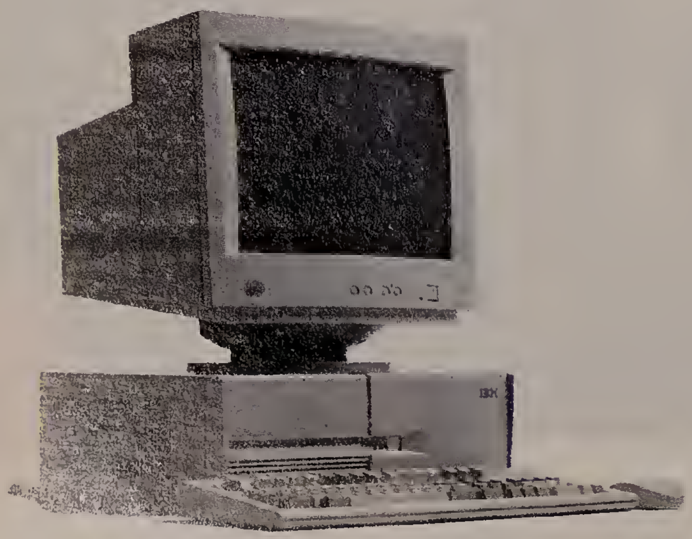

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Cogent

Continued from page 27

products to market more quickly.

Cogent will use its Gigabit Scalable Fast Ethernet technology to provide 1G bit/sec Ethernet adapters and LAN switches for high-speed connections to local servers and workgroup switches.

Unlike most vendors that plan to use gigabit Ethernet for switch-to-switch backbone connections, Cogent sees a greater need for 1G bit/sec gear in workgroup environments.

"We are seeing a bottom-up need for bandwidth starting to emerge as companies build intranets," said Charles Anderson, Cogent's president. "Most of this new data is traversing the local workgroup backbone, not the enterprise backbone."

While Cogent is taking a proprietary approach to gigabit Ethernet technology, the implementation is based on existing standards and, therefore, will be compatible with other vendors' Ethernet and Fast Ethernet products, Anderson said.

In addition, Cogent's gigabit Ethernet products will support Category 5 unshielded twisted-pair and multimode fiber wiring. The competing approach will likely require more expensive fiber-optic cabling.

But Diane Myers, senior analyst at In-Stat, a consultancy in Scottsdale, Ariz., said Cogent may have a hard time pitting its gigabit Ethernet implementation against that of heavy hitters such as 3Com, Compaq and Sun. "Customers might be leery of implementing a technology that is being proposed by a smaller company like Cogent. So gaining widespread approval is going to be their most difficult task," she said.

Cogent's technology utilizes parallel multiplexed channels of Fast Ethernet to achieve 1G bit/sec data rates. Multiplexing is applied to the independent channels to distribute and recombine the packet flow into an integrated high-speed channel.

Cogent's Gigabit Scalable Fast Ethernet will combine as many as 10 parallel Fast Ethernet channels using a proprietary switching scheme. Also, Anderson said that Cogent's products will be scalable to allow customers to buy in at current bandwidth requirement levels and upgrade over time by adding individual 100M bit/sec channels.

Pricing for the Gigabit Scalable Fast Ethernet products is expected to be at about $100 per channel. Products will be available by year-end.

©Cogent: (800) 426-4368.

MORE ON-LINE

Read articles on gigabit Ethernet and other proposals to turbocharge LANs on Network World Fusion (http://www.nwfusion.com). Select News+ then Local Networks.

NetworkWorld Fusion

Seagate

Continued from page 27

to back up and store data while the network is up or down.

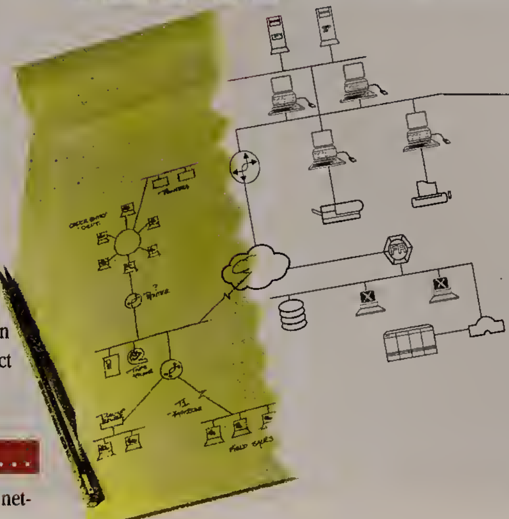
Backup Director and Storage Manager, obtained via Seagate's Palindrome Corp. acquisition, can manage application backup and storage across multiple LANs. Backup Exec, obtained via Seagate's acquisition of Arcada Software, Inc., is designed for coordinating backups across smaller LANs with multiple servers.

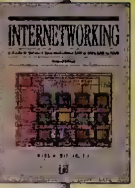
Seagate's Backup Director and Storage Manager agents for Oracle and Exchange Server on Windows NT will be available this month for $995 per Oracle server. The Seagate Backup Exec module for Exchange Server is priced at $695. An Oracle agent for Backup Exec for Windows NT is in the works.

Veritas cracks mirroring problem

Separately, Veritas Software Corp. announced a new tool called VxSmartSync that hastens the recovery of mirrored Oracle database servers. VxSmartSync can accelerate reconstruction of the databases. VxSmartSync is available immediately for SunSoft, Inc.'s Solaris servers running the Oracle7 database. A single server license starts at $495.

©Seagate: (800) 327-2232; Veritas: (415) 335-8000.





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- Understand the key internetworking features of AppleTalk, Banyan VINES, NetWare, OS/2 LAN Server and Windows NT
- Discover some key applications for narrowband ISDN technology
- Compare the technologies and operation of ATM, frame relay and SMDS, and discover the role of the broadband implementers: the Frame Relay Forum, the ATM Forum and the SMDS Interest Group
- Understand the detailed operation of Ethernet, IEEE 802.3, token ring and FDDI, and key performance characteristics of these technologies
- Evaluate the differences between Transparent Bridging, Source Routing and Source Routing Transparent Bridging internetworking standards
- Utilize available software tools in the network optimization and modeling process
- Examine application gateways that connect LANs, minicomputers and legacy systems
- See how SNMP plays a key role in internetwork management including the management and operation of broadband networks
- Understand the operation of IP-based routing
- Match the appropriate LAN application with the WAN broadband technology
- Understand TCP/IP and the Internet protocol suite, including ARP, ICMP, UDP, SMTP, TELNET and FTP
- Explore the internetworking challenges of remote access and wireless communications

1996 LOCATIONS AND DATES

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New York, NY	February 27–28	Boston, MA	May 14–15
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Client/Server Applications

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Conferencing • Imaging • Multimedia • Development

Briefs

Inmagic, Inc. *this week will announce DB/Text WebServer, a* **text database management system** *for handling HTML documents. Available next month, DB/Text WebServer runs on Windows NT servers and requires a HyperText Transfer Protocol World-Wide Web server. Pricing is $5,000 per server.*

Inmagic: (617) 938-4442.

Casahl Technology, Inc. *is shipping Replic-Action 3.0, a client/server replication tool for* **Lotus Development Corp. Notes** *that now supports all Notes native data types as well as parallel database replication.*

The software replicates data between Notes 3.0 and 4.0, and lets Notes clients update several SQL databases. Replic-Action 3.0 runs on Windows 95, Windows NT, Windows 3.1 and OS/2 servers, and on all Notes client platforms. Replic-Action costs $1,500 for the Development Server and $10,000 for the Production Server.

Casahl: (510) 736-7704.

Vtel Corp. *last week announced two Internet-enabled team* **conferencing systems** *aimed at small workgroups. The TC 1000, priced at $22,995, consists of a Pentium-based PC with integrated videoconferencing, an audio system, microphone, monitor and camera. The TC 2000 offers the same setup plus a standard network interface that supports speeds of up to 512K bit/sec and 30 frame/sec, as well as graphics software. The TC 2000 costs $34,995. Both offerings are available now.*

Vtel: (512) 314-2700.

Level/5, *a division of* **Information Builders, Inc. (IBI),** *last week announced plans to include a World-Wide Web authoring tool for creating searchable Internet applications with its QuestServer data search engine. QuestServer uses fuzzy logic to glean information from Web sites. It works with standard SQL databases and HyperText Transfer Protocol servers.*

IBI: (212) 736-4433.

Brainstorm gives Notes tool a Web connection

By Barb Cole
Cambridge, Mass.

Brainstorm Technology, Inc. this week will announce a new version of its Visual Basic-based tool that will make it easier to build Web-enabled and mobile applications based on Lotus Development Corp. Notes.

Brainstorm's VB/Link 4.0 supports Microsoft Corp.'s OLE custom control technology, now known as ActiveX controls, which enables VB/Link applications to be embedded inside World-Wide Web browsers.

"Our current customers were basically locked into building traditional client/server applications," said Mitch Liu, chief technology officer and co-founder of Brainstorm.

Previously, VB/Link was compatible with components known as Microsoft Visual Basic controls (VBX) that were loosely supported in a smattering of development tools and had no direct links to the Web.

Since ActiveX is expected to be broadly supported by a wide variety of browsers and application tools, developers will be able to more reliably share components between VB/Link and other tools, according to Liu. In addition, ActiveX components may be run from within Microsoft's own Internet Explorer as well as Netscape Communications Corp.'s Navigator.

On the mobile applications front, VB/Link now supports two-way replication between cli-

See Notes, *page 38*

VB/LINK GROWS UP

Previously

- ▶ **Used** for building client/server applications based on Notes databases.
- ▶ **Supported** replication from Notes servers to mobile clients.
- ▶ **Programming** required to access Notes rich-text data.

Now

- ▶ **Can be used** to build either client/server or Web-based applications based on Notes databases.
- ▶ **Supports** bidirectional replication between Notes servers and mobile clients.
- ▶ **No programming** required to access Notes rich-text data.

New offerings bring the Web and databases together

By John Cox

Spider Technologies, Inc. has introduced a tool set that packages graphical development programs with a Java code generator and database access technology, one of a new breed of products aimed at creating database applications that use Web browser front ends.

Spider's NetDynamics package has three parts. One is a set of development tools that let programmers use mouse clicks and menus to build what Spider calls a framework for a database application. Second, the code generator uses the framework to create Java classes to implement the application. This code, called a Java application server, can be changed using the tool set's object editor programs and runs with the product's third part — the NetDynamics Application Server (NDAS).

NDAS, in turn, has several parts: multiple high-performance APIs to Web servers; Open Database Connectivity (ODBC) code to let the application access external databases; and other software to sustain application sessions and state, as well as to administer NDAS.

Here's how the collection of tools work:

A Web browser sends a request via an HTML page to the Web server. In response, the server can use the Netscape Communications Corp. Server API, the Microsoft Corp. Internet Server API or an optimized Common Gateway Interface to invoke an application function on a Java server that has been built with the NetDynamics development tools. The Java code calls to the database access code in order to access a remote database. Just as NDAS maintains an application session, the database access code maintains a persistent connection to the target database.

NetDynamics applications can exploit the security and transaction features of the back-end databases. To handle increasing traffic loads, developers can create new copies of the Java application server and the database access code, and run

See Web, *page 38*

New tools for Web database development

Vendor/Product	Description	Platforms	Price	Availability
Spider Technologies/ NetDynamics	Graphical tool set for building Web-based, scalable Java application servers with database access	Unix, Windows 95 and Window NT; works with most leading databases	Starts at $1,995 per developer	By early May
NetScheme Solutions/ InterMart Toolkit	Translates database structures into a format that lets Web browsers easily query relational data	Windows NT Server and Microsoft SQL Server; client can be a Web browser on Windows, Unix or Macintosh OS	$695 per server	July (beta in May)

Oracle puts ConText into databases

By John Cox
Redwood Shores, Calif.

Oracle Corp. is readying an option for its database that will let end users query text in addition to more typical structured data.

The option is based on Oracle's ConText software, which parses text and runs it through an extensive set of analysis rules to decipher its meaning. This lets end users query the text more accurately, searching for subjects and meanings instead of just key words.

Oracle acquired the ConText technology about three years ago, intending to integrate it with various products. It has been used with Oracle's text management products and the discontinued Oracle Documents product.

"We've taken ConText and put it into our database base kernel," said Brett Newbold, vice president of the Oracle ConText server group. "You can [then] build document and intranet applications on top of ConText."

Most relational databases house ASCII text information, but because SQL does not support text, this information has been obtainable only through cumbersome programming, according to Newbold. ConText will read text columns, assign index values to them and create indexes on the fly. Then developers can use an HTML editor to create a query screen that combines both structured relational fields and unstructured text fields.

The software might be useful, for example, for insurance companies that routinely store text information about traffic accidents.

With ConText, a query could ask for all automobile accidents that occurred while changing lanes on the freeway, according to Newbold. "You could never do this type of query before on the production database," he said.

ConText also can be used for managing text stored outside the Oracle database, such as in an electronic mail document.

ConText will be an option with Version 7.3.3 of Oracle's database, which will become generally available in June. Pricing has not been finalized, but Newbold said it would be less than $500 per concurrent user.

©Oracle: (415) 506-7000.

Sybase extends product line

By Elinor Mills
San Francisco

Sybase, Inc. last week announced at DB/EXPO '96 here that it will roll out new database server connectivity and replication tools as part of an initiative dubbed Universal Connectivity.

The DirectConnect ser-ver provides Sybase users with complete read and write access to IBM, Oracle Corp., Informix Software, Inc. and Computer Associates International, Inc. databases. It features the following:

- A front-end graphical user interface management tool for remote administration.
- Optimized transaction management that's separate from decision-support administration.
- Transparent routing of clients to new servers without requiring changes to multiple client workstations.

DirectConnect server will be available in July for Application System/400, MVS and Oracle platforms. Pricing was not announced.

Sybase also introduced Open Client and Open Server 11.1, designed to simplify multitiered environments by transparently connecting any clients with any number of servers, databases or applications.

The Open Client 11.1 programming interface harmonizes protocols and data formats, while Open Server 11.1 enables customers to develop middle-tier server applications that are transparent to the client.

Open Client and Open Server 11.1 are scheduled to be available on Windows 3.1, Windows 95, Windows NT, HP-UX, AIX and Solaris by October. Open Client 11.1 will cost about $800, and Open Server 11.1 pricing starts at $75.

Sybase and BMC Software, Inc. also are developing replication agent software for mainframe data access to IBM IMS and VSAM platforms. In addition, Sybase will provide a Replication Agent for DB2. The software will be available before the end of the year.

For more information, contact Sybase at (510) 922-3500.

Mills is a correspondent for IDG News Service in the San Mateo, Calif., bureau.

Notes

Continued from page 37

ents and servers.

Previous versions of VB/Link only allowed one-way replication between a designated master site and remote systems, which limited the types of mobile applications that could be built.

"This new release will give me more flexibility in the way I develop my internal data-handling applications as well as my mobile applications," said George Hoffman, an application developer in the product development division of Sandoz-Agro, a division of Sandoz Corp., a pharmaceutical company in Des Plaines, Ill.

Although the firm's Notes salesforce application is not currently using the Web, Hoffman said that could change next year.

Developers will also be able to generate applications using VB/Link 4.0 that more closely resemble the Notes user interface, according to Liu.

The software includes NotesView for constructing applications that incorporate the Notes hierarchical look and feel, and Notes Rich Text for accessing native Notes data without programming.

Available next month, VB/Link 4.0 is priced at $795 per developer.

©Brainstorm: (617) 621-0800.

Find more on-line, including:

- Articles on new developments in building Notes applications
- A downloadable copy of the ActiveX development kit
- A look at Brainstorm's existing Groupscape tool for linking Notes to the Web

Select News+ then Client/Server Applications

NetworkWorld Fusion

Web

Continued from page 37

these on multiple computers, according to Ofer Ben-Schachar, Spider's chairman and chief technology officer.

Separately, NetScheme Solutions, Inc. last week announced its InterMart Toolkit for building a graphical model of Microsoft's SQL Server database structures and then generating HTML forms to navigate through the data. Its goal is to let end users query relational data with a Web browser, without writing SQL code.

The Marlborough, Mass.-based start-up demonstrated its offering at DB/EXPO '96. The tool kit's NetScheme Modeler component uses a wizard program to examine the database schema and create a Navigation Model that identifies business objects such as a specific customer and the navigation links between them.

The Navigation Server component uses this model to translate requests from a Web browser into SQL queries that run against the target database. A special control program lets developers set variables to prevent queries from returning vast amounts of unneeded information over the network.

The tool kit also includes an ODBC driver that lets any ODBC-compliant desktop application access the Navigation Server. InterMart works with an array of HTML editors, Web browsers and Web servers. The Navigation Server runs on Windows NT Server.

©Spider Technologies (415) 944-7400; NetScheme: (509) 480-0877.

SHARED LOGIC

Application management: Looking for a few good agents

Next month, 3Com Corp. will begin shipping Version 1.0 of its Traffix network management software, which will take advantage of intelligent agent technology to provide meaningful network performance statistics at the device level.

What is significant about Traffix, from the client/server application standpoint, is that it will provide the ability to simultaneously monitor the unique usage patterns of multiple applications.

Marc Myers

Traffix will utilize 3Com's technology for embedding agents into network hardware devices. The agents collect usage information and when alarm levels are reached, alert the central network management console.

The most critical advantage that agent technology provides is the ability to monitor network devices without any dependence on the centralized network management software. The agent removes the necessity of polling network devices to gather usage and status information. Instead, the console is notified only when problems exist, eliminating the bandwidth clutter that would be created by polling.

Traffix takes intelligent agents to a new level where the usage information and alarms can be configured relative to specific application information. For example, Traffix will be able to tell you whether the alarm that just went off on your router, for example, was caused primarily by Lotus Development Corp. Notes or database traffic.

Another compelling feature is Traffix's ability to autocalibrate, a technique where the monitored device automatically resets the error notification levels on a port-by-port basis, based on historical information.

In other words, autocalibration takes into account the fact that different ports on a device may have much heavier traffic. It allows for these differences by lowering the threshold for error notification on seldom-used ports and raising the threshold on chronically busy ports.

Traffix is definitely a step in the right direction for network management. But several features are missing that I hope will find their way into future versions. For example, the autocalibration only takes into account the usage statistics accumulated since the last time the device was powered up. It only uses information stored in nonpermanent memory, making its ability to calibrate accurately subject to how accurately the current batch of information represents overall usage.

Also, the alarm level each port is set to should be determined using some kind of rule-based expert system, unlike 3Com's current strategy, which is to simply set the alarm threshold to the highest throughput recorded in the current period plus 20%.

The other feature that really needs enhancements is the ability to monitor at the application level. This is an intriguing feature because it finally begins to bridge the gap between network performance tuning and the applications that blindly utilize network resources.

Automating the retrieval of usage information at a detailed application level will probably require that application tools companies also begin to explore how to integrate their products' network service layers with the agents provided by networking vendors. This will be a significant step toward the seamless integration of applications and the networks on which they run.

Myers is president of Client/Server Connection, Ltd., a Cambridge, Mass.-based firm specializing in client/server software solutions. He can be reached at (800) 622-1108, Ext. 522, or via CompuServe at 71332,1726.

BusinessBriefs

PC DOCS Group International, Inc., a document management software maker, last week acquired **Working Set, Inc.**, which makes a database access tool for the Internet.

Working Set's DataRamp uses the Open Database Connectivity specification to access multiple databases, including those from Oracle Corp., Sybase, Inc. and Informix Software, Inc., via the Internet.

PC DOCS earlier this year announced a broad plan to Internet-enable its document management software. Terms of the deal were not disclosed.

Workflow and imaging giant **Wang Laboratories, Inc.** has announced plans to acquire **DataServ,** a consulting division of BellSouth Corp., for about $30 million.

DataServ specializes in computer maintenance and support services for point-of-sale retail companies, as well as application help desk and network integration services. DataServ had revenues of more than $100 million in 1995.

Intranets & the 'Net

Covering: Internet Technologies and Services
for Collaboration and Electronic Commerce

Briefs

ICL, Inc. *last week began shipping the $7,500 i500 Web Connector, a program that runs on Hewlett-Packard Co.'s UX10 and lets users access ICL's* **X.500** *Enterprise Directory Server with a standard Web browser.*

ICL: (714) 855-5505.

CompassWare Development, Inc. *said its Magnet-Search Engine for* **distributing news feeds** *from Dow Jones and Reuters will now work over the World-Wide Web.*

CompassWare: (212) 685-4220.

A **Tandem, Inc.** *company, Atalla, is teaming with microchip manufacturer VLSI, Inc. to develop card-size* **data encryption** *products for electronic commerce applications such as home banking and making credit card payments over the Internet.*

Cable & Wireless, Inc. *said it is giving its customers the option of receiving an* **electronic bill** *rather than a printed form for outbound voice, 800-number and calling card use.*

PointCast, Inc. *of Cupertino, Calif., last week announced a software product that will let companies* **broadcast internal corporate news** *over their employees' idle computer screens. Priced at $995, the Windows-based PointCast I-Server rests behind a corporation's firewall and acts as a local broadcast facility for corporate intranets.*

A beta version will be available within the next 60 days.

Users will also have access to the PointCast Network's public channels, which automatically display news and sports updates when the viewer's computer screen is not in use.

NetSpeak Corp. *of Boca Raton, Fla., recently unveiled* **WebPhone 1.0,** *a Windows-based application that lets users telephone each other over the Internet using their electronic mail addresses.*

WebPhone, priced at $49.95, is available through NetSpeak's home page and is also being distributed via the home pages of over 100 Internet service providers.

Quarterdeck on a roll with Web applications

By Joanie Wexler

Marina del Rey, Calif.

Quarterdeck Corp. is on a 'Net bender.

The software company next week will announce several Internet initiatives at Internet World in San Jose, Calif., all designed to get its technology in the hands of the masses.

The moves include a resale and applications-hosting partnership program for Internet service providers (ISP), an on-line commerce offering called TownSquare and a Web authoring/serving tool dubbed TotalWeb that will sell for under $100.

Although it introduced its first 'Net product only a year ago, the company now markets 12 of them and is striving to glean two-thirds of its revenue from Internet products by 1999, according to Quarterdeck President Gaston Bastiaens. The company is partnering not only with ISPs, but also with PC, modem and chip manufacturers and, eventually, telephone companies to bundle Web application software.

Quarterdeck trims 'Net sails

The company intends to:

- Provide software to ISP partners on which they can build value-added services.
- Partner with PC, operating system, modem and chip makers to bundle Web application software into their products.
- Facilitate collaboration on the Web by integrating voice, groupware and chat applications.
- Leverage agent technology to run queries across intranets and the Internet.

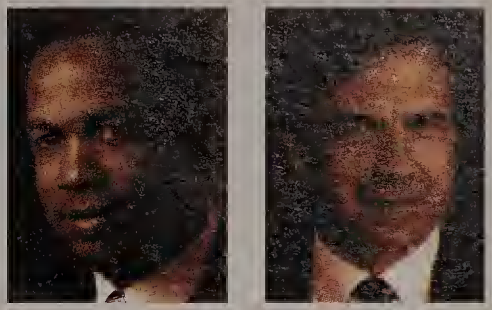
Quarterdeck has already teamed with Hayes Microcomputer Products, Inc., which resells its Internet connectivity software. And ISPs Netcom Communications, Inc. and PSINet, Inc. both resell Quarterdeck software that automates setting up an Internet account.

Quarterdeck intends to broaden the ISP program next week, allowing service providers to host Quarterdeck applications, such as Global Chat — a real-time text "conversation" application — or its newly acquired TalkShow 'Net collaboration software.

Amy Wohl, president of Wohl Associates, a consulting and research firm in Narberth, Pa., said that for users, "there are potential performance benefits" in getting Quarterdeck software on-line.

Quarterdeck's focus is on World-Wide Web and intranet applications for collaboration, security, publishing, information management, messaging, administration and connectivity.

"We don't want to get caught in the high-risk [browser] platform wars" of Microsoft Corp. and Netscape Communications Corp., said Emerick Woods, Quarterdeck's vice president of Internet solutions. But Quarterdeck does make a browser that is included in its Internet-Suite bundle of Internet applications.



Quarterdeck's *Woods (left) and Bastiaens lead move away from utilities, straight into the Web.*

"Their strategy is correct," said Ken Defoe, a Quarterdeck investor in Pleasant Hill, Calif. "People do want to buy interoperable Internet products from one company. And Quarterdeck will do the acquiring rather than being the one acquired."

Quarterdeck, in fact, bought TalkShow's inventor, Future-Labs, Inc., late last month. The company has plans to eventually integrate TalkShow with Global Chat and Quarterdeck's WebTalk Internet phone product.

The integration of the chat and voice features will be available in beta soon.

Users in a chat session will see a phone icon next to the names of participants who are WebTalk-enabled, allowing them to communicate via voice instead of text if they choose, said Bob Kutnick, chief technology officer for Quarterdeck.

He indicated there would be other voice 'Net products to come, such as voice mail and paging. ■

PageMill does Windows, too

By Carol Sliwa
and Ellen Messmer

Spring has arrived, and Web authoring tools are sprouting all over the Internet landscape.

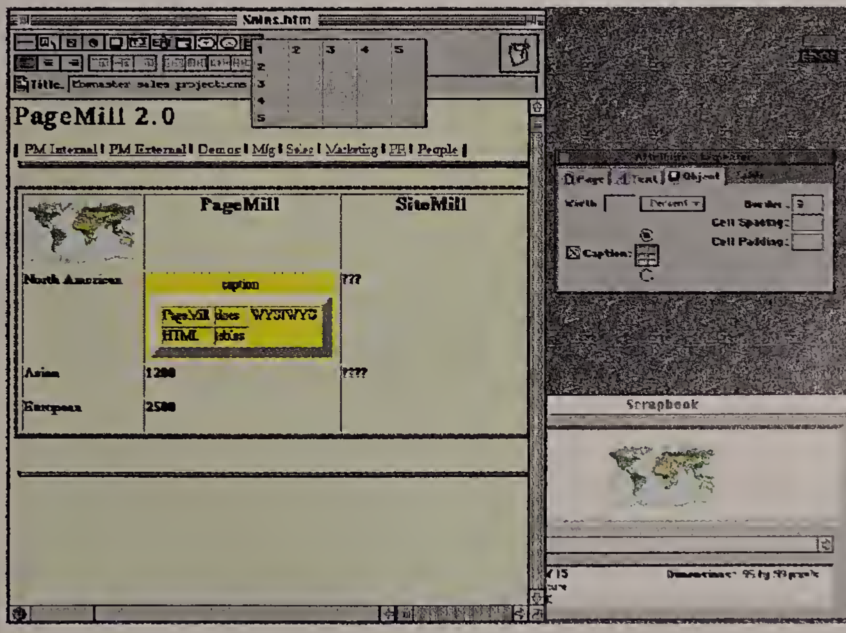
Adobe Systems, Inc. of Mountain View, Calif., announced today that its PageMill Web publishing software will be available on the Windows 95, Windows NT and Macintosh platforms with the July release of Version 2.0.

PageMill 1.0, which came out late last year, had been available only on the Macintosh platform because the company's prime audience, graphic communications professionals, typically use that platform, said Kevin Wandryk, Adobe's director of business development for the Internet products group.

Adobe also will enhance the $99 Windows version of PageMill by permitting users to view and edit the HTML source code if they choose, rather than simply work on the PageMill document. Other new features include WYSIWYG table creation capabilities and in-line support for multimedia data types.

Rad media tool

RadMedia, Inc., however, hopes companies will select its new Web authoring tool, PowerMedia, over PageMill.



Mac *authoring tool brings its strengths to Microsoft.*

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The PowerMedia viewer is a Web plug-in application that uses Netscape Communications Corp.'s Navigator APIs for playback and control of content.

"Shell Oil has been beta-testing PowerMedia to train their exploration engineers," said Jeff Morgan, RadMedia's president.

PowerMedia, which costs $495, is available now for Windows 95, Windows NT and Unix, with versions for the Macintosh and Windows 3.1 to ship in June. The viewer costs $29.

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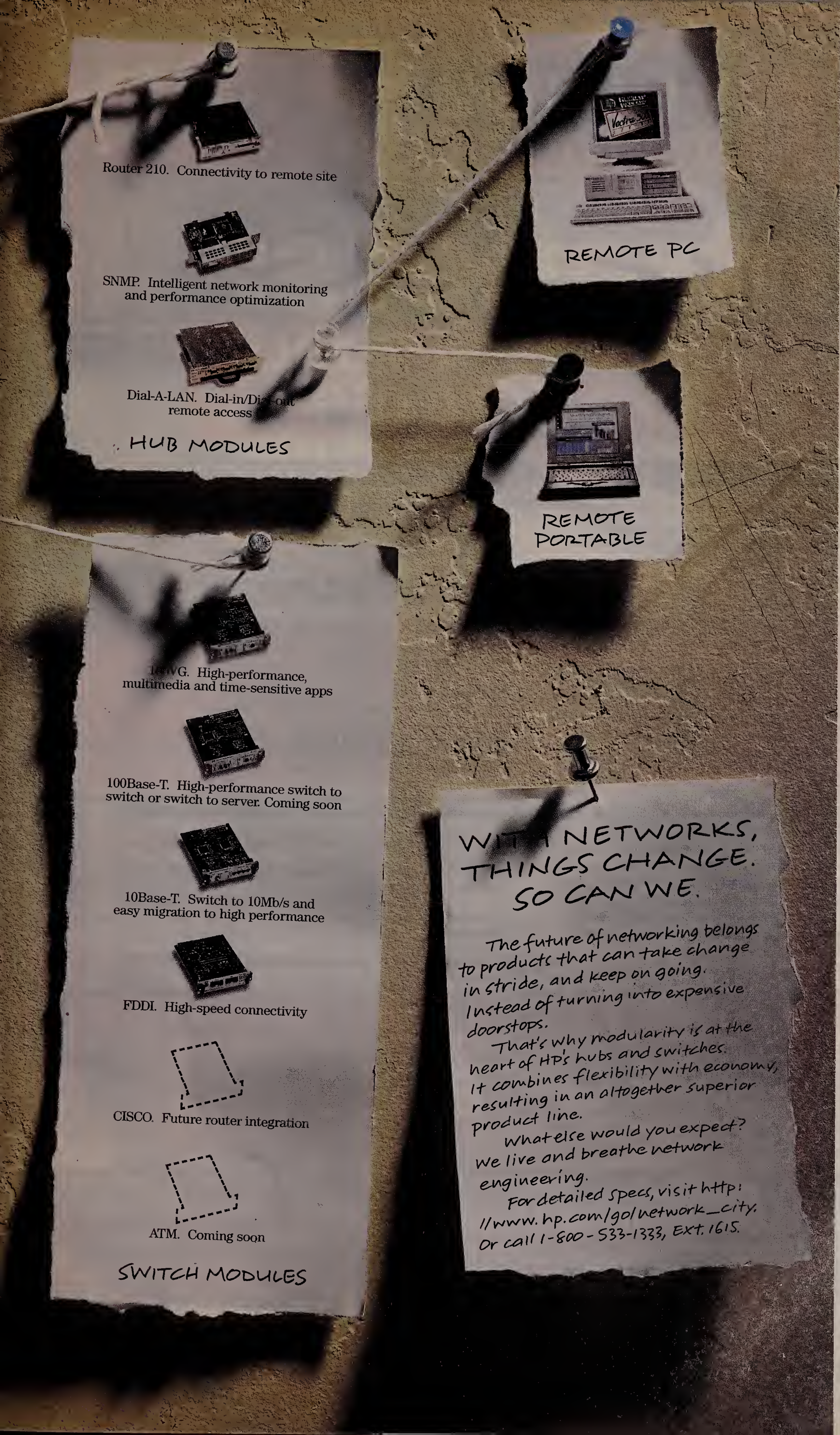

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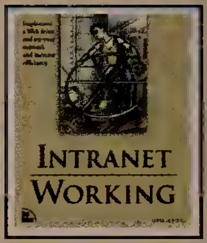

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Technology Update

Keeping Up with Network Technologies and Standards

NETWORK HELP DESK

Network World *tracks down answers to your questions. Please submit them to Chris Nerney via phone at (800) 622-1108, Ext. 451, the Internet at cnerney@nww.com or fax at (508) 820-1103.*

I am having problems getting an accurate count on the number of NetWare 3.12 users logged on when I use FCONSOLE to get information for clearing connections. It seems like overkill to use RCONSOLE to access the system console, and I can't find any patches on the NetWire site. Any suggestions?

Dana Harrington, Minneapolis Community College

Sounds like the problem is communications-related, says Ron Nutter, Master Certified Novell Engineer in the Lexington, Ky., area. Try downloading and applying LIBUP7.EXE, LANDR4.EXE and STRTL4.EXE on your server.

This will update the CLIB.NLM, MSM31X.NLM, ETHERTSM.NLM, TOKENTSM.NLM and, potentially, your LAN driver. If your network card is not supplied in LANDR4.EXE, get the latest driver from the vendor.

It also is a good idea to apply appropriate patches — consult the README file — from 312PTD.EXE to the server, and make sure you are using the latest ODI drivers and NETX.EXE or VLM.EXE files.

By the way, there is nothing wrong with using RCONSOLE to have MONITOR.NLM delete the connections.

We are having a puzzling NetWare 3.11 problem. When we try to Ncopy from PC or local server drives across our WAN to one of our server drives, we get Shell error 332-76 message, which says there's a problem receiving from the network. What can we do?

John Rusnak, via the Internet

It seems like there's heavy traffic to and from the workstation, Nutter says. Apply LIBUP7.EXE, LANDR4.EXE and STRTL4.EXE to the destination server. Then make sure the ODI drivers and the NETX.EXE or VLM.EXE on the workstation are the latest versions. You also may want to upgrade your 3.11 server so it can use NetWare 3.12 and later ODI drivers.

To determine if the problem is hardware-related, try using a different network card.

Mobile client management: Tracking a moving target?

By Jim Soriano

Keeping track of mobile computer users is a challenge worthy of the almighty Hercules.

Standards such as the Desktop Management Interface (DMI) and Simple Network Management Protocol define some objects that can aid network managers in troubleshooting mobile connections, but they don't go nearly far enough.

For instance, they do not allow network managers to troubleshoot PC card socket configuration problems, identify dial-up users so they can be routed through the firewall or recognize that a failing laptop battery is going to knock out the network port.

In the perfect MIS world, these issues, even though they are unique to mobile users, would be covered by network management standards. Network managers would be able to use Hewlett-Packard Co.'s OpenView or some other umbrella management system to track mobile workstations just as they do to troubleshoot desktop systems.

The Mobile Management Task Force (MMTF) is trying to move the industry closer to this ideal. The MMTF, a coalition of computer systems and software makers, hardware vendors, users and other professionals, works with the Desktop Management Task Force, the Internet Engineering Task Force (IETF) and other standards-setting groups to create Management Information structures that extend today's network management standards to encompass the evolving needs of the mobile computing environment.

MIBs go mobile

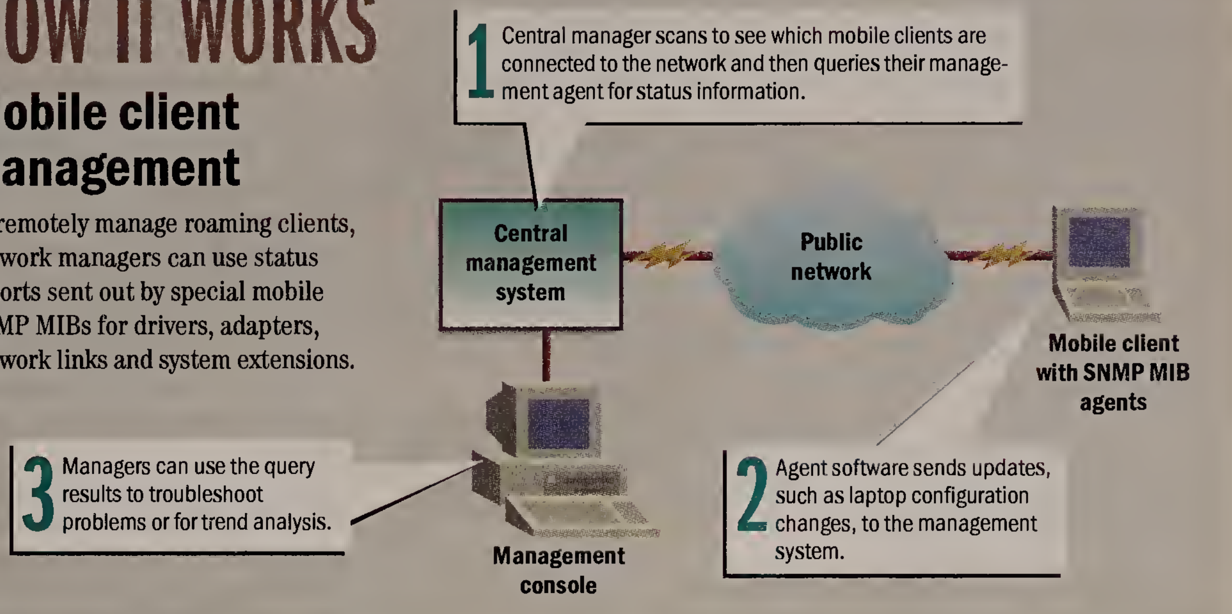
As an advocate for mobile computer administrators and users, the MMTF already has made inroads with standards-making bodies. It recently defined a set of SNMP Management Information Bases (MIB) to facilitate the administrative task of managing clients in a modern mobile environment. Member company Xircom, Inc. later this spring will submit the mobile MIBs to the IETF for standards consideration.

The MMTF determined that mobile users' administrative needs vary so widely it would be technologically impractical to create a single mobile MIB capable of meeting all the requirements. Instead, it defined four sub-MIBs — dealing with the system, the adapter, the link and extended systems, respectively — so implementers can tailor management applications to meet individual needs.

HOW IT WORKS

Mobile client management

To remotely manage roaming clients, network managers can use status reports sent out by special mobile SNMP MIBs for drivers, adapters, network links and system extensions.



1 Central manager scans to see which mobile clients are connected to the network and then queries their management agent for status information.

2 Agent software sends updates, such as laptop configuration changes, to the management system.

3 Managers can use the query results to troubleshoot problems or for trend analysis.

The MMTF engineered the four MIBs from a core base of DMI Management Information Format (MIF) files. These MIFs are analogous to SNMP's MIBs: Implementers can use common agent technology found in DMI software development kits to translate MIFs into MIBs.

This means implementers can use MIFs under a common agent or DMI Service Layer or rely on MIBs under an SNMP agent to provide either SNMP or DMI support for mobile users in a managed network environment.

The four-MIB/MIF approach lets SNMP implementers adopt targeted methods for mobile management without incurring the burden of additional resource requirements such as memory and processing power. It also gives network managers the flexibility to create standards-based solutions that can be used for specific mobile technologies, including dial-up access, cellular links and infrared connections.

MIBs defined

With the System MIB, network managers can get to details about mobile system drivers. Objects in this MIB include mobile power management definitions such as battery status, and PCMCIA drivers such as card and socket services.

The Adapter MIB details the hardware and operation of the mobile network adapter itself, whether it is attached to a personal, local- or wide-area network over a wired or wireless link.

The Link MIB defines details about the mobile network link. It provides information on status, performance, accounting and usage, and the type of host to which the mobile user is connected.

The Extended System MIB contains other system extensions, such as proxy group, that relate to the mobile network.

Through these four mobile MIBs, the MMTF has defined a set of management objects that can be incorporated into any network management application. The objective has been met to isolate those objects that administrators want to manage and that are unique to mobile computing users.

The mobile management agent software, which includes the MIBs, will execute in client computers running Microsoft Corp.'s Windows 95 and Windows NT operating systems.

It is now up to vendors to determine how the MIF/MIB standards can be best integrated into the next generation of mobile networking products.

Soriano is vice president of product development at Xircom, Inc., a Thousand Oaks, Calif.-based company that makes remote access products. He can be reached at (805) 376-9300.

Check out more information on the MMTF's mobile MIBs on Network World Fusion. Select NetRef, Technology Resources then Network Management.

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EDITORIAL INSIGHTS

Universal service is no demo

If you think network managers have a tough time sorting through vendor hype, imagine what it's like for members of Congress or the Federal Communications Commission.

Many times, I've seen folks from the networking industry lead a prominent policy maker through a high-tech show, invariably involving a broadband WAN connection and a socially useful application like the spinning image of an X-ray.

Each time, I've had the urge to sidle up to Mr. or Ms. Bigwig and whisper, "Listen, Senator Smith (or Commissioner Jones), that's just a demo! It doesn't work that easily in real life!"

In effect, that's what carriers and user groups are telling the FCC in their comments on the agency's preliminary proposal to expand universal service under the new telecom law.

Universal service is the policy under which everyone gets telephone service at a reasonable price. Basically, most of us pay a bit more so that rural customers aren't gouged because they live far from the nearest switch.

Now Congress has directed the FCC to expand universal service to include advanced telecommunications services. And it established mandatory subsidies or discounts for many schools, libraries and hospitals to get these services.

The FCC's first crack at this task shows how technological naivete can cause a well-meaning idea to run amuck. The agency skipped over universal service candidates like voice mail and E-mail to suggest a mandatory discount for ISDN and ATM, at least for health care institutions seeking telemedicine applications.

They could not have picked two more difficult and costly technologies to propose as a new entitlement. Such a policy would ruin one of the key intentions of the telecommunications act — to lower prices. To support ISDN and ATM as part of universal service would almost surely raise prices on everything else.

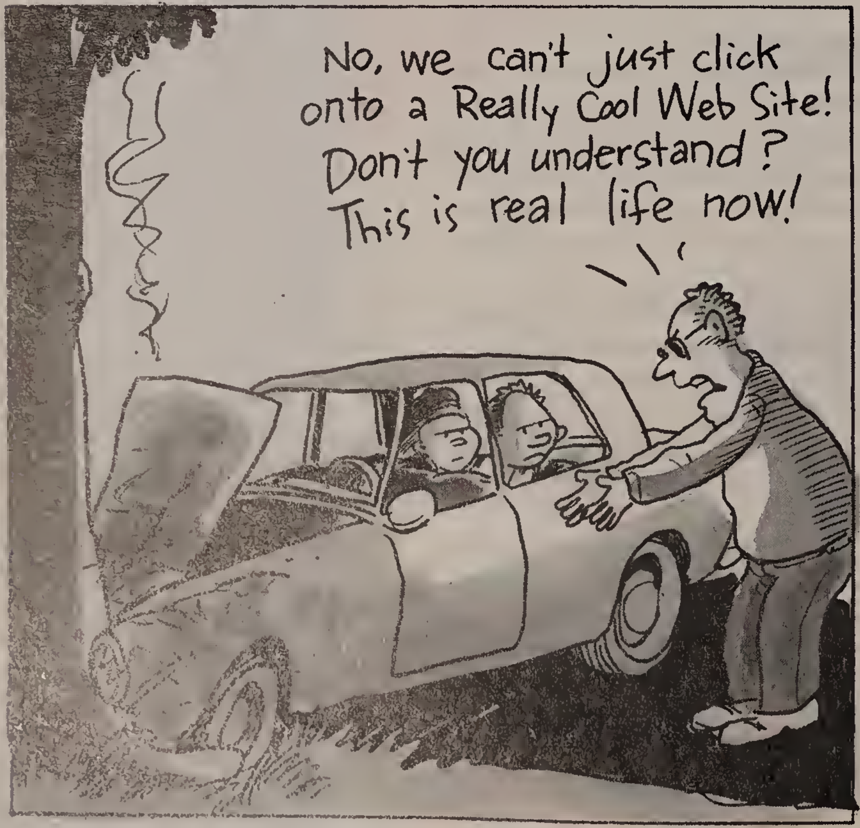
And the Council on Competitiveness just reported that telemedicine is failing to take hold because states won't license it and Medicare won't reimburse for it. What's the point of subsidizing it now while these problems loom?

Fortunately, Congress gave the FCC the leeway to take a more conservative tack on the question. Agency officials should put on the skeptic's hat they're supposed to wear as regulators and take advantage of that opportunity.

David Rohde, senior Washington correspondent drohde@nww.com

Teletoons

By Phil Frank and Joe Troise
guru@well.com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ABOVE THE CLOUD

On-line services will mutate to survive in the age of the World-Wide Web

James Kobielus

On-line services such as America Online, CompuServe and The Microsoft Network will survive in the World-Wide Web era, despite stiff competition from the new breed of low-cost, bare-basics Internet service providers (ISP). Network managers who have considered moving their corporate users to ISPs should give on-line services another good, long look.

On-line services have many fundamental strengths that will help them weather the new competitive storm. Most important, they have trusted brand names, broad content offerings, well-managed internal networks, and strong service billing and collection systems — advantages of which few ISPs can boast. They also have the financial resources needed to stick it out over the long term, unlike the commoditized ISPs, many of which are unlikely to survive the current price war initiated by AT&T's and MCI Communications Corp.'s entry into the ISPs' market segment.

Nevertheless, on-line services will be hard-pressed to distinguish themselves competitively from ISP upstarts over the next few years. Recently, many industry observers have questioned the continued need for America Online, CompuServe and their ilk in an age when anybody with an ISP account, asynchronous SLIP modem connection and Netscape Navigator browser can partake of the world's on-line riches.

On-line services will be hard-pressed to distinguish themselves competitively from ISP upstarts over the next few years.

We're in for a serious shakeout in the on-line services industry through the end of this decade. You can glimpse the shape of on-line services to come by examining the forces that are pulling apart the tidy proprietary world of the traditional service provider in the following areas:

■ **Access services.** On-line service providers have traditionally taken great pride in their nationwide points of presence, which make them accessible to most subscribers through a local dial-up modem call.

But now that AT&T and others are practically giving away Internet access, on-line service providers are reexamining their connect charges, which are effectively driving customers away from their POPs and into the arms of the ISPs. To sustain strong subscriber growth rates, American Online and its brethren are having to open their networks to access from anyone anywhere on the Internet, not just from their own POPs.

■ **Menu, directory and search services.** On-line providers have a wonderful ability to organize their proprietary information services into simple menus, buttons and dialog boxes.

However, they can't hold a candle to the dozens of Internet and Web search services that have sprung up, such as Yahoo and Alta Vista, which allow a simple keyword search to produce hundreds of hits in no time at all. In the future, the on-line service directories will need to be built upon bigger, badder "spiders" — new terminology referring to automated Web indexing engines — that index everything in creation, not just the information hosted on the provider's computers. To hold down the search-related network traffic, on-line service providers will have to put bigger chunks of these indexes on off-line CD-ROMs mailed to subscribers.

■ **Hosting services.** On-line providers maintain big data centers to support electronic mail boxes, real-time newsfeeds, document libraries, specialized forums and other subscription services. The Internet and Web have turned that data processing model on its head, allowing anybody who sticks a computer on the network to serve anything to all comers. On-line service providers will not be able to buck this distributed hosting trend, but will be able to offer hosting on high-visibility Web sites linked tightly into their directory services.

■ **Content services.** On-line providers typically have relied on third-party content providers, retained under exclusive contracts, to sustain a continuing feed of fresh new information for hungry subscribers. However, the Internet and Web now allow everyone from the president of the U.S. to your mother to make every scrap of information in their possession available on-line to all comers, cutting the cyber-middleman out of the picture. To retain some substantive identity and avoid becoming empty vessels for Internet and Web information, on-line services will have to function more like television networks, generating some distinctive content on their own and acquiring the rest from independent producers.

Ultimately, on-line services will evolve into what might be called "subscription intranets," providing tidy packages of guaranteed, high-performance, premium information services for paying subscribers while maintaining a semipermeable membrane to the broader Internet and Web. Regular subscribers will be provided with a seamless view of intranet and Internet services, while sporadic and ad hoc subscribers entering from the 'Net will be provided with a more limited range of offerings.

You can accelerate the evolution of on-line services by letting the brand-name providers know that your primary requirement is high-performance Internet access, search and retrieval. You can drive this point home by switching to ISPs when they offer a more cost-effective Internet-oriented service package. Today's on-line service providers will survive only if they have the ability to recognize the centrifugal forces that are tearing their world apart and the agility to reconfigure themselves on the fly.

Kobielus, a contributing editor to Network World, *is a senior telecommunications analyst with LCC, L.L.C., an Arlington, Va.-based network design and engineering firm. He can be reached at (703) 807-5075 or via the Internet at kobielus_james@lccinc.com. The opinions expressed are his own.*

SYSTEMS MANAGEMENT

Behavior mgmt. tames client/server environments

John McConnell

If you manage a complex client/server environment, chances are you've had a hard time bringing it under control. The real challenge is to manage systems behavior in order to deliver high performance and service quality.

Behavior management requires responding rapidly and intelligently to events that occur while the applications are running. Management elements in multiple systems must be coordinated to keep applications running smoothly.

Seagate Enterprise Management Software, Inc. is spearheading a noteworthy effort to make behavior management easier. This approach leverages Seagate's NerveCenter event correlation system in a new architecture that simplifies the configuration and control of distributed elements that poll systems and network devices, process events and automatically schedule the appropriate responses.

Behavior management requires responding rapidly and intelligently to events that occur while the applications are running.

NerveCenter technology is distributed in Fast Reasoning engines and agents that are controlled from a management console running on Hewlett-Packard Co.'s OpenView or Cabletron Systems, Inc.'s Spectrum. The administrator uses NerveCenter's state-transition interface to describe how events are processed and what actions should be taken under different circumstances. These management policies are enterprise-specific, allowing organizations to take the actions necessary to support their business goals.

For example, a policy can identify mission-critical applications and ensure they receive priority when system failures reduce the available resources.

The Fast Reasoning agents collect and correlate system information, then schedule management tasks as defined by an administrator's policy. They report conditions to the Fast Reasoning engine, which correlates reports from a set of agents. The agents and engines perform event correlation and policy control within a system and across a set of systems, respectively.

The Fast Reasoning engines, running on Unix or Windows NT, control a set of agents by loading the appropriate policies, which the administrator has defined, into each agent. Agents in NetWare, NT, Unix and other environments use minimal system resources since the engines retain the policies and download them as needed.

Unfortunately, most administrators lack the time to develop policies from scratch. Seagate has responded by providing behavior models, which describe a set of policies and event correlation rules for specific management tasks. Seagate also provides tools for administrators to modify or create their own behavior models.

Customized behavior models for intranet management were part of the initial launch of behavior models earlier this month at NetWorld+Interop 96 in Las Vegas. Seagate agents monitor Microsoft Web Servers and the Fast Reasoning engine correlates performance data to identify high-demand areas and potential bottlenecks. The agents take action in real time to balance the traffic across the servers. More behavior models from Seagate and other vendors will follow.

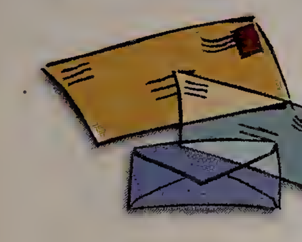
Administrators should welcome an approach that lets them enforce management policies and control agents in a distributed client/server environment.

To evaluate the Fast Reasoning infrastructure, determine which system behaviors are hard to control. For example, is it difficult to keep performance levels high, to ensure that system resources are able to support the demands, or to schedule operations efficiently? If a set of criteria for detecting the problem and providing a response is defined, then Seagate's NerveCenter can be used to build policies, distribute them to appropriate agents and simplify a complex challenge.

The evolution of distributed, intelligent agent frameworks continues as the centralized SNMP management platform is increasingly unable to cope with the demands of emerging client/server environments. Behavior models supported by a set of intelligent agents using the NerveCenter will help you control this dynamic and complex environment.

McConnell is president of McConnell Consulting, Inc. in Boulder, Colo. He can be reached via the Internet at johnmc@mcconnell.com.

MESSAGE



QUEUE

ATM investment protection

Available bit rate (ABR) is an important ATM Forum traffic management specification. Once bandwidth has been reserved for constant bit rate and variable bit rate, lower priority data-oriented connections vie for the remaining bandwidth. ABR promises to provide the same statistical bandwidth advantages as unspecified bit rate (UBR), but enhances UBR's efficiency and fairness by effectively managing bandwidth utilization and traffic flow.

ABR is a much-anticipated capability and is receiving a great deal of attention from the press. However, some confusion seems to have arisen about the level of ABR support attainable in the current generation of ATM switches. Many people incorrectly believe that all existing ATM switches will have to be replaced to support ABR.

For example, in your article "Cough it up for ATM" (Dec. 18, 1995, page 1), Allen Robel, senior network planner at Indiana University in Bloomington, explained that he would likely have to replace all of his Cisco Systems, Inc. ATM switches to gain ABR support. In Robel's opinion, "The fact that the ATM equipment is obsolete now, well, that's the price you pay as an early adopter."

In reality, Robel's perspective does not accurately apply to the majority of the ATM switches presently installed on customer premises around the world. Specifically, not a single Fore Systems, Inc. switch has ever required a forklift upgrade to support current ATM standards, including support for ATM Forum standard-compliant ABR. These switches support ABR standards today with Explicit Forward Congestion Indication (EFCI), and these same switches will support emerging ABR standards, including Explicit Rate (ER) and Virtual Source/Virtual Destination (VS/VD), with simple, cost-effective field upgrades.

It is worth noting that in most network configurations, EFCI will be adequate for most ATM switches, while ER will be required in some backbone switches and VS/VD is necessary in switches connecting to WAN services.

What this means is that a Fore Systems ATM switch purchased in 1993 can still support all ATM Forum ABR standards in 1996 and beyond. These same switches, which have been in the field for up to three years, also support standards-based LAN Emulation, User-Network Interface signaling and Private Network-to-Network Interface, all essential in large-scale ATM networks. This level of ATM investment protection is unprecedented.

Joe Skorupa
Director of marketing,
ATM switches and internetworking
Fore Systems, Inc.
Warrendale, Pa.

Quibbles and bits

Let me respectfully quibble with Ed Krol's opinion concerning Usenet (April 1, page 65). It appears my Internet service

See **Message queue,** *page 51*

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NetworkWorld PC WORLD

SERVER TEST SERIES

Digital's Prioris XL Server 5133 and IBM's PC Server 320

We have a new leader in both performance and price/performance with this month's server test, replacing previous leaders from Hewlett-Packard Co. and Compaq Computer Corp. The Digital Equipment Corp. Prioris XL Server 5133 obviously inherited the fine engineering that made Digital's minicomputers famous. It makes the most of its 133-MHz Pentium CPU and, in other configurations, can support a second processor. It take the top spot in both our performance and value leader tables.

IBM's PC Server 320 sports a 90-MHz Pentium CPU, which accounts in part for its slower performance. However, the IBM server comes with more Level 2 cache and slightly more storage, factors that help explain its higher price tag.

The *Network World/PC World* Server Test Series is a monthly feature in which we evaluate file and application servers. Our testing measures performance from the client's point of view, and we report the time it takes to complete typical tasks. A complete description of our test methodology and the configuration of our Houston-based lab is available on Network World Fusion.

Our file server tests run scripts on ascending numbers of clients for four applications: Microsoft's Word and Excel for Windows, Lotus Development Corp.'s 1-2-3 for Windows and Corel Corp.'s WordPerfect for Windows. The scripts perform file-access operations such as opening, importing and saving files.

PRICE/PERFORMANCE INDEX 231

We have two application server tests. The first is a client/server database test that uses Microsoft Access on the front end and Oracle Workgroup Database 7.2 on the back end. We perform various read and write operations on a three-table payroll management application. The other is a Notes test that uses Lotus Notes Release 4.0. We access multiple views in a database, then each document within each view.

Our performance summary graphs show the results of each test in scripts per minute, with numbers of clients ranging from one to 16.

- File server average
- Database average
- Notes score

Because the tests run faster than a real client could perform the operations, each of our test clients stresses the servers as much as several real users.

Our performance rating is derived by adding the file server performance in scripts per minute to the average of the two application server tests, at the 16-client level. We then divide the price of the server as tested by the performance rating to get our price/performance index. Because both lower price and higher performance are desirable, a lower price/performance index indicates a better server value.

Get the complete results of our server testing on Network World Fusion. Select NetRef, Buyer's Guides and Reviews, then Servers.

http://www.nwfusion.com

NetworkWorld Fusion

PC Server 320/8640-OYT

VENDOR: *IBM*
CONTACT: *(800) 772-2227*
PRICE: *$8,599*
PERFORMANCE RATING: *27.3*

PRICE/PERFORMANCE INDEX 315

Note: A lower price/performance index indicates better value.

WORTH NOTING

Tall and thin, IBM's PC Server 320 appears almost elegant in its casing. Its front bezel is styled rather than just designed. We hope we're not paying extra for good looks, but this server seems reasonably priced. The solid performance of this 90-MHz Pentium-based computer shows that you don't need the fastest processor to have a good workgroup server.

The PC Server came with Windows NT installed. We used IBM's Server Guide product to install NetWare. Server Guide is a collection of CDs and software that allows installation of various software and network operating systems, including NetWare, OS/2 Warp Server and IBM's NetFinity network management product.

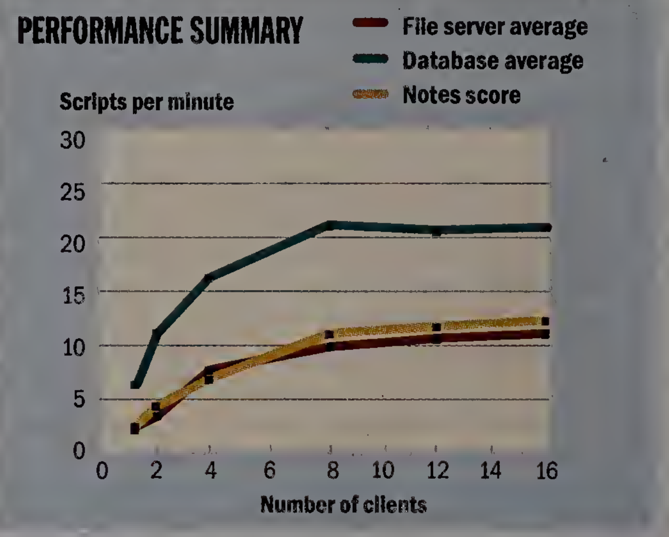
The NetWare installation worked well and even reminded us that we would have to install NetWare Directory Services later. The installation also warned us that it hadn't detected a network adapter, despite the fact that the server was equipped with one of IBM's own. We installed the adapter software later from an IBM-supplied diskette.

Windows NT, unfortunately, is not included in the Server Guide product.

Inside the case, it's easy to get to SIMMs, PCI and EISA slots, and processor sockets, but a little more difficult to get to drive bays. Drives slide out the back, but that's cramped; it would be better if they could slide out the front. There are no rails for the drives; they screw directly into the bays.

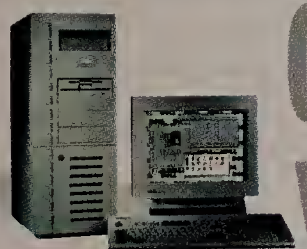
The system is quiet and cooled with a single fan besides the one in the power supply.

IBM's useful documentation includes a user's handbook and reference, Adaptec controller user's manual, Ethernet adapter user's manual, and American Power Conversion (APC) PowerChute Plus user's guide and cable, which is used to connect to an APC uninterruptible power supply (UPS).



THE INSIDE STORY

Model	Digital's Prioris XL Server 5133		IBM's PC Server 320	
Processor	133 MHz Pentium with 256K byte L2 cache		90 MHz Pentium with 512K byte L2 cache	
Maximum processors	Dual 133-MHz Pentiums with 512K byte shared L2		2 90-MHz Pentiums	
Memory	**As tested**	**Maximum**	**As tested**	**Maximum**
	32M bytes (16 base)	512M bytes	32M bytes	256M bytes
Slots	**Provided**	**Open**	**Provided**	**Open**
EISA	4	4	5	4
PCI/EISA	1	0	1	0
PCI	2	2	2	1
Processor	1	0	0	0
Total	8	6	8	5
Bays	**Provided**	**Open**	**Provided**	**Open**
Internal	4	2	9	3
External	3	1		
Total	7	3	9	3
Storage				
Adapter	Integrated Adaptec 7870P		Adaptec AHA-2940	
Bus	Fast & Wide SCSI-2		Fast & Wide SCSI-2	
Capacity	4G bytes		1.2G bytes x 4 = 4.8G bytes	
Model	Seagate Barracuda ST 32550W		Quantum Atlas XP31070W	
Average seek time	Not available		8.5 msec	
Transfer rate	Not available		8.2M bytes/sec	
Embedded cache	Not available		1024K bytes	
Maximum drive capacity	**Internal**	**External**	**Internal**	**External**
	16G bytes	240G bytes	27G bytes	81G bytes
Base drive capacity	1G bytes			
CD-ROM	Toshiba XM5301B 4X SCSI		Matsushita 2X SCSI	
Network adapter	Digital Fast EtherWorks 10/100 PCI		IBM 10/100 PCI	
Fault tolerance features	Parity memory (ECC optional), optional RAID controller		Parity memory, built-in surge surpressor	
Security features	Chassis lock, lock down ring, power-on and keyboard passwords		Supervisor and user passwords, diskette access control, write protect boot sector, door lock, bolt down feature, optional cable cover	
Certifications	NetWare, NT Server, Digital Pathworks, SCO UNIX, Banyan VINES, Windows for Workgroups, IBM OS/2, MS-DOS, Windows and Windows NT workstation		OS/2 LAN Server, NetWare, UnixWare, Windows NT Server, SCO Open Desktop/Server, SCO OpenServer, SunSoft Solaris	
Bundled software	ServerWorks Quick Launch, ServerWorks Manager (workgroup administrator apps and SNMP agents)		APC PowerChute Plus, Server Guide (NetFinity 3.05, NetWare 3.12 and 4.1 from IBM, OS/2 Warp V.3, SCO Open Server Release 3.0, OS/2 V.3)	
Miscellaneos	3-year on-site with next business day response, 300W power supply		300W power supply, 7x24 toll-free phone support, 3-year on-site warranty, start-up support	



Calling all vendors

We invite and encourage all vendors of file and application servers to participate in our Server Test Series. For information on how to be included, contact the director of the Network World/PC World Server Test Center, Bill Rinko-Gay, at (713) 376-8771 or bill—rinko-gay@pcworld.com.

PERFORMANCE LEADERS

Model	Issue tested	Top performance score
Digital Prioris XL Server 5133	This issue	**41.5**
HP NetServer 5/133 LH	2/19/96	**38.6**
Compaq ProSignia 500 Model 5/120-2100	2/19/96	**32.2**
CSS MaxPro 1500 P5-166	3/18/96	**31.9**
IBM PC Server 320/8640-0YT	This issue	**27.3**

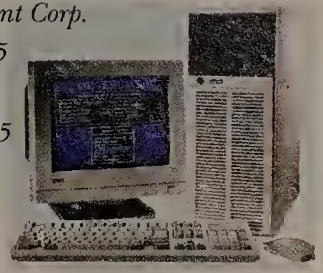
VALUE LEADERS

Model	Issue tested	Price/ performance index
Digital Prioris XL Server 5133	This issue	**143**
Compaq ProSignia 500 Model 5/120-1200	2/19/96	**175**
HP NetServer 5/133 LH	2/19/96	**213**
CSS MaxPro 1500 P5-166	3/18/96	**279**
IBM PC Server 320/8640-0YT	This issue	**315**

Prioris XL Server 5133

VENDOR: *Digital Equipment Corp.*
CONTACT: *(800) 344-4825*
PRICE: *$5,950*
PERFORMANCE RATING: *41.5*

PRICE/PERFORMANCE INDEX
143



Note: A lower price/performance index indicates better value.

WORTH NOTING

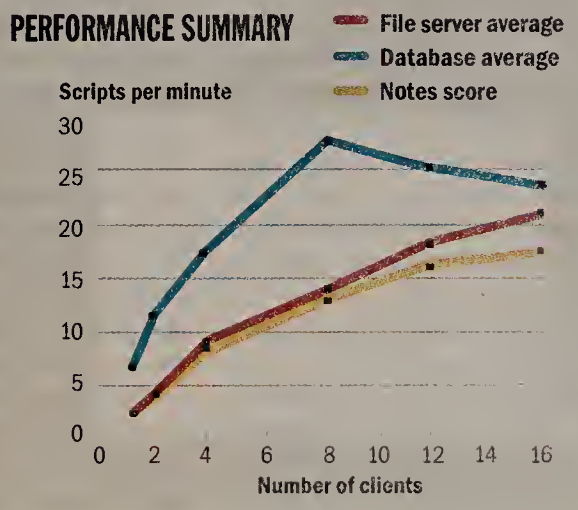
Digital Equipment Corp.'s latest workgroup server posted the best scores of the six servers we've tested so far. It integrates SCSI, network adapter and PCI performance across a fast backplane for excellent overall performance.

The server comes in a minitower case cooled by two fans, including one in the power supply. Outside, the front bezel sports a mechanical lock that can secure the plastic door over the floppy and CD-ROM. The only LEDs on the front indicate power and disk access.

The system also has a power and a reset switch. In the back, the integrated video, parallel and serial ports are easy to access. The icons distinguishing the mouse and keyboard ports are hard to see, but this is probably more of a problem for us in a lab setting than it would be in a typical environment.

The Prioris demonstrates the good engineering design Digital is known for. Its cover can be removed without screws; a mechanical lock holds it in place. Inside, all parts, including SIMMs, are easily accessible. The front bezel need not be removed to pull out the diskette and CD-ROM drives. The server's hard drives are not hot-pluggable, but they can be removed easily without any tools. The tower is compact but not crowded inside. While cabling a SCSI drive array might be difficult, there is more than enough room inside for the options installed.

Digital includes ServerWorks and ClientWorks, a pair of applications that provide management for all Simple Network Management Protocol-compatible devices on the network. According to Digital, the Windows-based ServerWorks package allows you to create customized alarms and alerts, and its autodiscovery feature keeps you from having to manually track your devices. Remote Server Manager is also available with additional hardware.



MARTY BRAUN

Kicking the tires of TCP/IP

A good look under the hood shows what you really get with different types of stacks.

By Dave Kearns

With so many desktop and network operating systems coming packaged with an IP stack and protocol suite, there really should be no need to buy a separately packaged IP stack, drivers and application suite, right?

Well, not quite.

Users and even vendors agree there are a number of reasons you might want to splurge on a packaged TCP/IP implementation from companies including FTP Software, Inc., NetManage, Inc., Walker Richer & Quinn, Inc. (WRQ), or even Cisco Systems, Inc. and Novell, Inc.

Frank Whitney, senior technical analyst for corporate information systems at Kruger, Inc., cites "reliability, features, and customer and technical service" as reasons for going with a store-bought stack. For George Cohen, network support specialist at the University of Texas Medical Branch, the key differentiators were cost of implementation, maintenance and support.

Still others cited ease of use, systems management and security.

On the other hand, if all you need is a World-Wide Web browser, File Transfer Protocol (FTP) and perhaps a mail client, then you may find the TCP/IP stacks in Windows for Workgroups, Windows NT, Windows 95, OS/2 Warp, the Macintosh operating system or NetWare more than adequate, especially when coupled with free or low-priced applications.

The tricky part is determining which type of TCP/IP implementation you need where. More than likely, you will need a mix of bundled and store-bought stacks.

Reliability and features

"The expensive stuff usually works better, gets the job done faster and reduces the number of headaches that you as an administrator will have," says Rick Morrow, network engineer at Maryland's Montgomery College.

As an example of the potential headaches, a number of users cite the recent report from Stardust Technologies, Inc., a WinSock compliance testing organization. Stardust calls Microsoft Corp. to task for not differentiating between standard and proprietary 32-bit WinSock API calls in its software development kit (SDK).

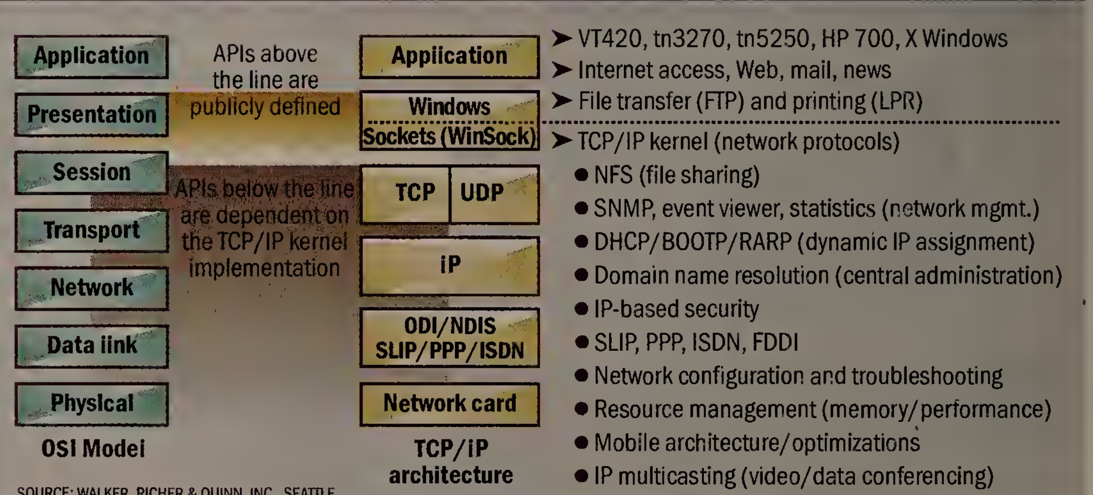
The report details how applications written with the Microsoft SDK might not work with other vendors' WinSock stacks.

Geoff Arnold of SunSoft, Inc. cites this as a major reason to implement purchased, third-party, open standards-based solutions. "The fundamental issue is one of interface specification," Arnold says. "There must be accurate, public specs."

Indeed, Rob Spence, product manager at WRQ, points out that "WinSock is just the surface of the TCP/IP stack, and it is not the only portion of the stack to which applications are written. This is where conventional wisdom breaks down."

It is below the WinSock layer where TCP/IP stacks are largely proprietary, with different architectural approaches to how they meet user needs. And many applications important to the smooth functioning of an enterprise network are integrated into TCP/IP below the WinSock level (see graphic).

Figure 1: Peeking underneath the WinSock line


Application
Presentation
Session
Transport
Network
Data link
Physical
OSI Model
APIs above the line are publicly defined
APIs below the line are dependent on the TCP/IP kernel implementation
Application
Windows Sockets (WinSock)
TCP
UDP
IP
ODI/NDIS SLIP/PPP/ISDN
Network card
TCP/IP architecture
➤ VT420, tn3270, tn5250, HP 700, X Windows
➤ Internet access, Web, mail, news
➤ File transfer (FTP) and printing (LPR)
➤ TCP/IP kernel (network protocols)
● NFS (file sharing)
● SNMP, event viewer, statistics (network mgmt.)
● DHCP/BOOTP/RARP (dynamic IP assignment)
● Domain name resolution (central administration)
● IP-based security
● SLIP, PPP, ISDN, FDDI
● Network configuration and troubleshooting
● Resource management (memory/performance)
● Mobile architecture/optimizations
● IP multicasting (video/data conferencing)

SOURCE: WALKER, RICHER & QUINN, INC., SEATTLE

WinSock, which stands for the Windows Sockets Specification, defines an interface between an application and the underlying IP stack. Each IP stack will have its own WinSock layer, but, at least in theory, any application written to WinSock should work with any vendor's WinSock implementation.

Many protocols and features, though, are not part of the WinSock standard; applications that need to take advantage of them must be written directly to the IP stack. Given that, most applications work with a particular proprietary IP stack must be supplied by the stack vendor.

Most do just that. Larry Backman, vice president of development at FTP Software, maintains that free IP stacks generally support only a small subset of the many protocols and services available via IP stacks from firms such as his.

It's true that operating system-based stacks generally include the most popular IP-based applications, such as FTP, telnet and HyperText Transfer Protocol, but they are not always quite up to snuff. Montgomery College's Morrow says the few applications included with the free

Figure 3: LOOK TO A THIRD-PARTY TCP/IP STACK IF YOU NEED:

- ✔ Full corporate connectivity with TCP/IP, UDP, LAT, IPX/SPX, SLIP, CSLIP and PPP
- ✔ VxD/DLL design for performance and reliability
- ✔ Management tools supporting features including SNMP MIB II, an event viewer and diagnostics
- ✔ Support for all existing name and address resolution protocols and current dynamic addressing
- ✔ Full-featured applications such as VT420/320, FTP client and server, tn3270E and tn5250, Internet and Intranet applications
- ✔ NFS capabilities
- ✔ Open connectivity – full WinSock compliance to ensure compatibility with third-party and Internet shareware/freeware applications
- ✔ Support for features optimized for remote computing, including dynamic link recovery, reductions in protocol overhead and increased throughput

Microsoft stack are "rather raw," lacking the polish, features and ease of use common in the purchased products.

Novell's Michael Simpson, product-line manager for NetWare, and IBM's John Albee, marketing brand manager for Warp Server, claim their companies are adding more services and applications to their bundled IP stacks, although they acknowledge these are still not as complete as some of the purchased stacks.

Microsoft engineer Henry Sanders, who wrote the TCP/IP implementation included with his company's operating systems, put it bluntly when asked why a Microsoft Windows user would ever need to purchase third-party IP stacks and products: "They have features that we don't offer."

Figure 2 lists many of the services, protocols and features supported by IP packages, showing whether each is generally supported in major third-party or bundled IP stacks.

Getting technical

Another reason users cite for going with third-party IP stacks is service and support. Theoretically, a company solely concerned with IP connectivity will devote all of its support resources to IP products, while larger software houses can devote only a fraction of their support services to IP products. Of course, a fraction of IBM, Novell or Microsoft can amount to a lot of people, but generally speaking, both the quality and availability of support will be better from the specialized vendors.

An additional consideration is the cost of technical support. "We found that the free support offered by Walker Richer & Quinn compared favorably with a cost of up to $35 per incident for free stacks," says Dave Stokes, network manager at New Media, Inc. "That leveled the playing field considerably."

End-user support

The support problem is compounded if you decide to use the different IP stacks offered with your various operating systems.

That was a key reason Rick Winklespecht, technology analyst at Hayssen Manufacturing Co., decided to go with a third-party vendor that supports DOS, 16-bit Windows, 32-bit Windows and Macintosh operating systems. "I don't have to track different products," Winklespecht says. "That will help simplify the transition as our company decides which platform to deploy in each division."

Figure 2: Vendor scorecard: who supports which IP services and applications

	Cisco Internet Junction	Firefox NOVIX for NetWare	Frontier Tech. TCP Suite	FTP Software OnNet	Hummingbird Comm. NFS Maestro	James River Group ICE TCP	NetManage Chameleon	Microsoft free stack	Novell free stack*	IBM Warp Server free stack
Platform										
DOS		✔	✔	✔	✔	✔	✔		✔	
Windows 3.1	✔	✔	✔	✔	✔	✔	✔		✔	✔
OS/2						✔				✔
Windows 95	✔			✔	✔		✔			✔
Windows NT	✔			✔	✔		✔	✔		✔
Macintosh				✔				✔		
Unix										
Communications/Protocols										
SLIP	✔	✔	✔	✔	✔		✔	✔		✔
CSLIP	✔	✔	✔	✔			✔			
PPP	✔	✔	✔	✔	✔	✔	✔	✔		✔
PAP		✔	✔	✔			✔			
CHAP		✔	✔	✔			✔			
PING		✔	✔	✔	✔	✔	✔			✔
FINGER			✔	✔	✔	✔	✔			✔
DNS (client and server)		✔	✔	✔		✔	✔			
RSH		✔	✔	✔	✔	✔	✔			
REXEC		✔	✔	✔	✔					✔
BOOTP		✔	✔	✔	✔	✔	✔	✔		✔
TRACE ROUTE			✔	✔	✔	✔				✔
ARP			✔	✔	✔	✔	✔			✔
Host access										
TELNET	✔	✔	✔	✔	✔	✔	✔	✔		✔
TN3270		✔	✔	✔	✔		✔			✔
TN5250		✔	✔	✔			✔			✔
File and print										
FTP	✔	✔	✔	✔	✔	✔	✔			✔
TFTP			✔	✔	✔	✔	✔			✔
NFS		✔	✔	✔	✔	✔	✔			
LPR/LPD		✔	✔	✔	✔	✔	✔			✔
E-mail/Applications										
MIME	✔	✔	✔	✔	✔		✔			
POP	✔	✔	✔	✔	✔		✔			
SMTP	✔	✔	✔	✔	✔		✔			
PROFS							✔			
UUENCODE		✔	✔		✔		✔			
MAPI		✔	✔	✔	✔		✔			
NEWS	✔	✔	✔	✔	✔		✔			✔
SEARCH	✔		✔							
ARCHIE	✔		✔				✔			
GOPHER	✔	✔	✔	✔	✔		✔			✔

*No applications come bundled with the stack but most are available in Novell's LAN Workplace product

On the other hand, Robert Bechtel, senior systems programmer for the city of San Antonio, Texas, mentions "tight integration with the OS" as a significant benefit of the free stacks when you have only a single platform to support.

Walter Knopf of Fermi National Accelerator Laboratories adds, "You wouldn't want to buy another one, since that would make life just harder, not better."

Most third-party IP stack vendors point to emerging addressing, security and multimedia standards as other reasons to buy their products.

Cisco's John Velzades, senior software engineer, and FTP's Backman both mention the expanded addressing field in IP Version 6 and the Resource Reservation Protocol (RSVP) bandwidth reservation protocol, which is key for multimedia applications, as features that will appear in their products as soon as they are standardized. Vendors of bundled IP stacks, they say, would probably have to wait for a new release of the parent operating system. Novell's Simpson, however, says his company would move as quickly as the third-party vendors to support these new protocols.

What should you do?

Given these sometimes conflicting signals, how do you decide which type of stack is best for your environment?

Most find that a mix of free and purchased products best fill their needs, using the free stacks for those users needing minimal IP services while purchasing full-featured application suites and IP stacks only for those users that require them. WRQ provides a checklist of services you can use to determine when you might need the full-featured purchased product (see Figure 3).

Network executives at Montgomery College, the city of San Antonio, New Media, the University of Texas and Kruger all indicate that, for the foreseeable future, they will continue to use a mix of free and purchased IP stacks and applications. Even users who have generally paid for their IP products, such as John R. Harris of Systems Engineering Solutions, Inc., are at least evaluating the free products.

"We have been pleased with the NetManage stack, since they bundle in so many other tools," Harris says. "But with our architecture now moving to NT, we will probably only be using the Microsoft stacks."

No matter which way you go, all agree testing is important. "There is no substitute for trying software in your own environment," according to Stokes.

Walker Richer & Quinn, not surprisingly, has lots to say about choosing between "free" and third-party TCP/IP stacks, including these white papers:

- What am I missing with a free TCP/IP stack?
- Kernel applications – the silent TCP/IP issue
- The hidden costs of free TCP/IP

Microsoft, meanwhile, offers a white paper of its own that outlines TCP/IP implementation details for its operating systems and a "bottom up" examination of the protocol suite. Select **NetRef, Technology Resources** then **Internet.**

NetworkWorld Fusion
http://www.nwfusion.com

With sufficient evaluation, following the criteria outlined above, your TCP/IP stack will provide the reliability, scalability and flexibility required by corporate networks for their mission-critical applications.

Ed Tittel, principal at the consultancy LANWrights, sums it up best: "If your IP networking only involves browsing the Web, then just about any stack will work for you. If, however, you want a coherent IP networking plan including a fair amount of functionality, flexibility and security, then you need to carefully choose the implementation you will use."

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Networking comes to the Florida keys

Continued from page 1

ran a 3,000-plus node network at the high-profile Kennedy Space Center at Cape Canaveral, Fla. And being perched on the lip of the Atlantic Ocean satisfied Perryman's thirst for sport fishing, which is the other love of his life.

But about a year ago, Perryman packed up and left. He took the bait offered by Florida's Monroe County to build its first enterprise network.

"The opportunity to build a network from ground zero is what did it for me," says Perryman, now Monroe County's network administrator. "Starting from scratch is a rare opportunity."

The fact that Monroe County extends 100 miles south from Key Largo to Key West didn't hurt either. Now, when Perryman emerges from his data center bunker, it is usually to bait a hook.

"Living down here, you've got to love the water," Perryman says. "There's not much else but the fishing and the network."

The network has yet to take shape physically, but Perryman has spent countless hours mapping it out with John Carter, director of office management and budget for Monroe County.

"We'll stick with one LAN type, one network protocol, one major software vendor," Perryman says. "We want to ensure that interoperability isn't going to be an issue."

The county will build a series of single-protocol LANs countywide, link them via a frame relay net and migrate IBM Application System/400 applications to the client/server environment. Monroe County will also create a series of World-Wide Web pages that provide the front door for residents and business owners to access government services.

Internet fix

That will be a far cry from what Perryman found when he arrived in Key West, where the county's IS department resides.

An aging AS/400 provides electronic mail and database access to local users, as well as to county workers in such places as Key Largo, Plantation Key, Marathon and Islamorada — towns that dot the stretch of sand and roads that form the Florida Keys. Remote office workers use PCs emulating 5250 terminals and communicate over costly 56K or 64K bit/sec leased lines back to Key West.

Carter, a former Southwestern Bell Corp. employee, penned a study on the county's long-range computing goals, which recommended client/server computing to reduce costs and improve services.

"It was obvious LANs were the way to go," Carter says.

"We come under enormous pressure to keep a lid on costs in county government," he adds. "We've got to automate these old manual processes, and introduce workflow analysis and groupware into the mix so we can make county government work better and smarter. It's all about saving money for taxpayers."

Part of the plan for accomplishing that involves using the Internet to allow residents to tap into permitting, bill paying and other services.

"The Internet will give a presence to certain aspects of county government without the travel that is required today," Carter says.

Recognizing that many residents are not likely to have their own PCs and Internet connections, the county plans to create Internet access sites at libraries up and down the island chain. Residents and local businesses will be able to apply for E-mail logons and use the public Internet-access kiosks.

Among the Internet-based services planned is one that will enable contractors to submit building permits for development on various islands, currently a tedious process.

Moreover, the Internet can help organizations such as the county's Code Enforcement unit and the Federal Emergency Management Association step up their enforcement efforts. County inspectors who encounter a derelict boat today, for instance, must return to their office to pull tax records or investigate outstanding violations.

Eventually, inspectors armed with laptop computers and cellular modems will be able to instantly pull up the records in question and make a decision on the spot.

"We know we aren't likely to add personnel, but if we can make it easier for them to get the job done, productivity will rise," Perryman says.

LANs for islands

Monroe County may have set its sights high with its vision of Internet-based government services, but the vision will take time to materialize because the county first must address net infrastructure issues. The simplicity of dealing with a minimal number of vendors and products, however, should limit delays.

Network simplicity has its impact on personnel, too. "You don't hire people who are specialists in a singular protocol or product," Perryman says.

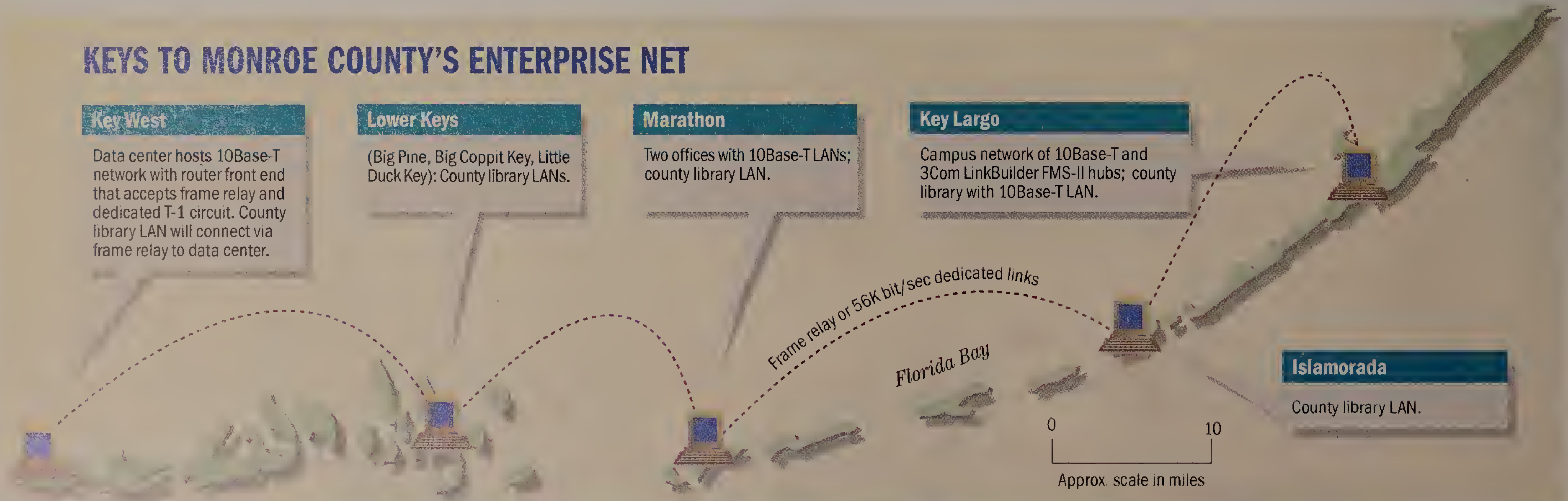
The request is in for county workers to install the 20,000 feet of Category 5 unshielded twisted-pair wiring that will serve as the conduit for LANs installed at 10 geographically dispersed county sites, plus five libraries.

A 3Com Corp. LinkBuilder FMS-II stackable hub at each site will be linked in a star configuration to downstream Dell Computer Corp. computers tied in via 3Com adapters.

Even though Perryman was more familiar with some other hub brands, he opted for 3Com's products after an exhaustive market analysis.

"3Com always stood out in terms of reliability, warranty and maintenance," Perryman says. 3Com's Transcend network management system and its support for the Desktop Management Task Force's Desktop Management Interface clinched the decision.

The emerald waters *and his love of sport fishing helped lure Ken Perryman to the Florida Keys, but it was the networking that hooked him.*



KEYS TO MONROE COUNTY'S ENTERPRISE NET

Key West

Data center hosts 10Base-T network with router front end that accepts frame relay and dedicated T-1 circuit. County library LAN will connect via frame relay to data center.

Lower Keys

(Big Pine, Big Coppit Key, Little Duck Key): County library LANs.

Marathon

Two offices with 10Base-T LANs; county library LAN.

Key Largo

Campus network of 10Base-T and 3Com LinkBuilder FMS-II hubs; county library with 10Base-T LAN.

Islamorada

County library LAN.

"With a [network] staff of four, the ability to have greater control over the desktop and look down to the interface card is extremely important to us," he says.

The 3Com choice also ensures the county can reuse the equipment as bandwidth needs expand.

"The infrastructure is in place if we want to move to 100M bit some day," Perryman says.

Each LAN client will run Microsoft Corp.'s Windows for Workgroups and communicate to Windows NT Servers, either locally or back at the Key West data center.

"NT Server is easier to configure, maintain and manage than NetWare 4, by all the accounts I've heard," Perryman says. Another reason for aligning with Microsoft, he says, is it provides the network operating system bundled with back-end services such as mail, database and applications.

"It's a total solution, and Microsoft can give us everything we need," Perryman says. "We don't have to worry about getting it all to play together from an integration standpoint."

The county will dedicate servers to run applications specific to departments such as social services, code enforcement and budgeting. The IS group will also maintain data center servers with applications such as mail, order processing, purchasing and scheduling. Eventually, the nets will handle traffic from 400 to 500 county workers.

In addition to county departmental LANs, five libraries will get their own local nets, but only one — in Key West — will be anchored by servers. LAN-attached clients at the other sites will communicate over existing 56K and 64K bit/sec leased lines to the card catalog system on the library server.

Some new LANs at other sites will likewise use existing leased lines to pump traffic down to the Key West data center. LANs at sites without dedicated circuits will route traffic over frame relay circuits to the county data center.

Monroe County has not yet selected a carrier or a router vendor because it is still trying to determine where it can get the best deal.

Perryman leans toward service providers who kick in the router hardware. If he cannot get his price, he will probably bring in 3Com routers to keep the equipment homogeneous, ensure vendor accountability and mitigate interoperability issues.

Keeping score

"Our goal is to build a high-quality network that delivers services to users quickly and economically," Perryman says. "We think we can do that by keeping things simple. We think we have a better way to build enterprise networks."

If the plan succeeds, expect to find Ken Perryman on the emerald waters of Key West, trolling for a 500-pound fish. But one thing about Perryman is evident — the fishing isn't what brought him to the Florida Keys; the networking hooked him first. ■

Message queue

Continued from page 45

provider (ISP) does not store all of the Usenet information on its server; it stores only the address of the originating ISP, but not the contributed information. If, for example, I select a Usenet item I know to have originated in Europe, the transmission time, even during the wee hours in Europe, is much longer than for an item of comparable length that was submitted via a nearby ISP.

While lawyers can — and will — debate the status of ISPs as publishers or carriers, the protection granted to carriers by the new Telecommunications Act of 1996 appears to have caused my ISP to open additional naughty newsgroups and to stop censoring the ones which it had carried. Traffic on the naughty bits groups is way, way up, or, err . . . so I'm told.

Commercial spams are the greatest problem with Usenet. More than half the postings on some newsgroups are sales solicitations sent to scores of groups. Perhaps the "spaminator" problem could be lessened by automatically blocking cross-posting at each ISP server. That would be easy to do, would ultimately reduce traffic and would increase Usenet satisfaction.

Dennis Brown
Arlington, Va.

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Briefs

Novell, Inc. *is offering a seminar for NetWare users that want to connect to the Internet or create an intranet.*

The Internet: from Basics to Implementation *is a half-day seminar that will be held in 18 cities nationwide. Attendees will learn about TCP/IP and Internet access options, as well as Internet and intranet business strategies. Several Novell products will be highlighted at the seminar, including NetWare Web Server, LAN WorkPlace, LAN WorkGroup, NetWare MultiProtocol Router and GroupWise.*

Novell Education: (800) 233-3382.

Anderson Soft-Teach, Inc. *is offering a network version of its* **SmartTrainer** *multimedia training programs that enables servers to download just audio or audio and video to desktops.*

When used on traditional LANs, such as 10M bit/sec Ethernet, the programs can be configured to ship just the audio portion of instructional material on how to operate applications such as Microsoft Word and Excel. Full video can be added when a faster LAN, such as 100M bit/sec Fast Ethernet, is used.

SmartTrainer runs on Novell, Inc. NetWare and Microsoft Corp. Windows NT LANs, and requires clients to have an Intel Corp. 80486DX or Pentium processor, Windows, 8M bytes of RAM and a sound card. Per-client pricing for an enterprise license is less than $100.

Anderson Soft-Teach: (800) 338-4336.

Technology Futures, Inc. *will hold its* **Technology Forecasting Workshop** *from June 3-5 in Austin, Texas.*

The interactive seminar will help attendees learn how to conduct trend and substitution analysis, as well as scenario planning when building technology forecasts. Attendees will learn how to integrate those forecasts into organizational planning.

Technology Futures: (800) 835-3887.

How to tell when it's time to send out for LAN management

By Lenny Liebmann

For The Bentley Company, Inc., a consulting firm in Hudson, Mass., the decision to turn over management of its LAN to an outside firm was straightforward. It came down to a personnel decision — one that was simplified by an open position.

"We made the decision when one of our employees left the company," says Tony Lapetina, Bentley's vice president of operations. Lapetina contracted with AMP NetGain Services of Billerica, Mass., for both LAN administration and help desk services, avoiding the higher cost of bringing a replacement on board.

Visit Network World Fusion to get more information on outtasking. Select **Careers** then **Outtasking** for links to:
- ▶ An earlier *Network World* article that defines outtasking and explains its benefits
- ▶ AMP NetGain Services' Web site, which has information about a free tool for determining the cost savings of outtasking
- ▶ An interactive forum about outtasking on the Outsourcing Institute's Web site

Network World Fusion
http://www.nwfusion.com

AMP NetGain Services now has a server at Bentley's site that acts as a communications and data collection system. Employees access information from the server to execute routine administration tasks or troubleshoot. Bentley users also have AMP NetGain Services' help desk telephone number programmed as a speed-dial on their phones.

Bentley is not alone. A number of users that are finding the increasing complexity of LANs and the even more complex technology used to manage them too much for internal staff are cutting outtasking deals.

Unlike typical outsourcing contracts that require you to turn an entire department over to an outside contractor, outtasking enables you to off-load specific functions such as the monitoring of servers and network hardware, capacity planning or emergency response. You can then maintain control of the more strategic part of the LAN, development of applications and data management, for instance.

LAN management outtasking is a particularly attractive option if you need to support remote offices. Providing dedicated on-site staff for these smaller installations is economically inefficient since the high fixed costs of payroll and equipment get amortized over fewer network seats. Furthermore, managing remote locations requires technologies and skill sets in which corporate managers may not want to invest.

Calculating the payoff

Building the economic argument for outtasking starts with an assessment of all the costs incurred for doing the job in-house. These costs include salaries, benefits, overhead, recruitment and training of qualified LAN administrators and/or help desk staffers, as well as the hardware, software and communications expenses associated with installing LAN management technology. If a remote site is being managed from a central location, periodic travel has to be calculated.

The actual dollar figures can vary greatly because salaries are different depending on the region of the country you're in, and the maximum number of LANs or desktops that an administrator can handle is subject to debate. But even using relatively conservative figures, a strong argument can be made for outtasking.

For example, several published surveys show the fully burdened cost for employing an experienced Certified Novell Engineer who can handle server administration and user support for three Novell, Inc. LANs with 25 PCs each will come to around $91,000. An outtasking service's monthly charges, by contrast, are often less than $500 per LAN server and $50 per supported desktop. So for the same installation, the annual cost comes to $63,000 — a savings of 31%.

Beyond the hard numbers is the issue of expertise. Many companies simply want to get out of the LAN management business. A lot of users are starting to say that because file server administration and desktop support are not strategic skills — there's simply no long-term benefit to pouring resources into them.

Contractor connections

While many service providers take complete responsibility for installing the necessary management technology, others can piggyback on the investments you've already made. Thus, your existing console can act as a data collection point for the vendor. Your WAN can also provide valuable communications infrastructure, bringing management data from remote LANs to a central point where it can be accessed by the service provider.

ISDN availability is now giving service providers greater bandwidth between central consoles and their clients' LANs. This increased throughput allows them to gather much more performance data in real time, enabling them to offer more in-depth analysis of network behavior and utilization trends.

"They're going to be able to anticipate when more problems will occur and be able to react to them sooner," says James Hale, controller at the Marriott hotel in Newport, Calif., which recently enhanced the service it receives from Computer Applications, a network integrator in Huntington Beach, Calif., with ISDN access.

"That's better than waiting until we crash," Hale says.

Liebmann is a consultant and writer in Highlands, N.J., specializing in networking technologies. He can be reached at ll@interserv.com or (908) 872-8500.

THE NETWORK PAYCHECK

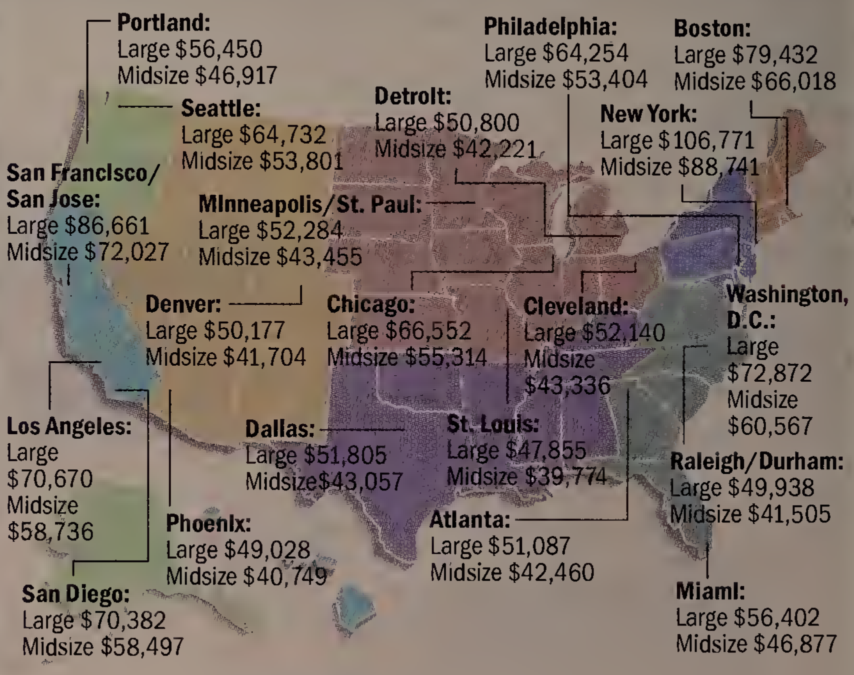
A glimpse at what you'll need to match to keep salaries competitive.

Title: Project manager for distributed systems

Responsibilities: Plan and oversee the development and implementation of networked computing environments

Average pay scale in large companies ($500 million or more in revenue):
Low end, $62,740; mid-range, $70,670; high end, $78,600

Average pay scale in midsize companies (less than $500 million in revenue):
Low end, $49,955; mid-range, $57,748; high end, $65,000


Portland: Large $56,450 Midsize $46,917
Philadelphia: Large $64,254 Midsize $53,404
Boston: Large $79,432 Midsize $66,018
Seattle: Large $64,732 Midsize $53,801
Detroit: Large $50,800 Midsize $42,221
New York: Large $106,771 Midsize $88,741
San Francisco/San Jose: Large $86,661 Midsize $72,027
Minneapolis/St. Paul: Large $52,284 Midsize $43,455
Denver: Large $50,177 Midsize $41,704
Chicago: Large $66,552 Midsize $55,314
Cleveland: Large $52,140 Midsize $43,336
Washington, D.C.: Large $72,872 Midsize $60,567
Los Angeles: Large $70,670 Midsize $58,736
Dallas: Large $51,805 Midsize$43,057
St. Louis: Large $47,855 Midsize $39,774
Raleigh/Durham: Large $49,938 Midsize $41,505
Phoenix: Large $49,028 Midsize $40,749
Atlanta: Large $51,087 Midsize $42,460
San Diego: Large $70,382 Midsize $58,497
Miami: Large $56,402 Midsize $46,877

Note: Figures reflect average salaries for 156 positions and are based on a survey of 105 Southern California companies. The data was adjusted using U.S. Department of Labor statistics to reflect regional cost-of-living differences.

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- LAN/WAN Internetworking (Frame Relay, X.25, routing protocols, SLIP/PPP, TELNET)
- Diagnostics software development
- Legacy Protocol development (HDLC, SNA Bisync, Async)
- Software Testing (writing test plans, developing stubs and drivers, implementing tests)
- Network Management (SNMP support and MIB development)
- ISDN Terminal Adapter and PRI products design
- Systems Management experience
- Embedded Network Security, Public Key Cryptography, SNMPv.2

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- Ethernet LAN interface development (DMA controller design, design of LANCAM)
- Token Ring LAN interface development (DMA controller design and design of SRT)
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Various positions exist for architects, team leaders, and group managers with a minimum of five years' design experience in a large routed/switched environment. Background with Cisco and Bay Network routers, Ethernet/FDDI switching, and ATM equipment required. Routing experience using BGP and OSPF, multiple AS, and large-scale firewall design required. Experience with large Internet backbones (DS-3+), including multiple-peering arrangements (NAP), highly desirable. Topology modeling using tools such as OpenView, Spectrum, NetSys desirable. Debugging skills at all levels of the TCP/IP protocol family are a requirement. In-depth ATM experience (PNNI, AAL5, LANE) highly desirable.

NETWORK ENGINEERING

Multiple positions exist for network engineers, network analysts, performance analysts, protocol engineers, security engineers, team leaders, and group managers. Requirements include five to ten years' experience with design, installation, and debugging of large routed and switched networks; high-level design/architecture experience; and protocol and hardware-level debugging. Knowledge of network hardware such as Cisco and Bay Network routers, DEC Gigaswitch (FDDI/ATM), Fore ATM switches, highly desirable. Experience with CAT-5, multi- and single-mode fiber, cable management and distribution systems required. Wide-area network candidates should additionally have expertise in leased line technologies (DSO, FT1, T1, DS3, OC-3, OC-12) as well as telco premise equipment. Debugging skills at all levels of Ethernet, FDDI, and TCP/IP protocol family are a requirement.

NETWORK SOFTWARE ENGINEERING

Multiple positions exist for software engineers with in-depth experience with routing protocols, especially BGP and OSPF. Experience with C/C++, SNMP2, and network software such as OpenView, Spectrum, CiscoWorks, Optivity, NetSys, StatsWise, and Cornerstone required. Experience with BSD sockets and System V Streams required. Experience with shell (Bourne or C), Perl, tcl/tk, a plus. Knowledge of the TCP/IP protocol family is a requirement; prior ATM programming in a mixed switched/routed environment (AAL5, LANE) highly desirable. In-depth knowledge of WWW servers, HTML (with Netscape extensions), cgi-bin scripts, and JAVA required. Experience with DNS, NTP, BOOTP, and Lotus Notes desirable.

NETWORK OPERATIONS CENTER STAFF

NOC SUPERVISOR, INTERNATIONAL OPERATIONS

Requires 5+ years' experience in a very large Unix environment with experience with TCP/IP, ISDN, X.25, frame relay, routers and bridges. In-depth knowledge of data center operations is a must, as is international telecommunications experience. Knowledge of ATM and PPP is a plus. Fluency in French, German and/or Japanese is desirable. (Dept. DB-102)

NOC SYSTEM OPERATORS

Multiple positions exist in our International Group for candidates with the same skill set as the Unix System Operators listed below. (Dept. DB-103)

UNIX SYSTEM OPERATORS

These positions focus on Unix systems, TCP/IP and X.25-based communications in support of U.S.-based services. Knowledge of HP-based applications such as OpenView and Glance with functional knowledge of G50 OS and HP-UX 9.0 is required. Experience with initial diagnoses and problem-solving for open-ended architecture systems, including Stratus, is preferred. To qualify, you need 2-3 years' experience with Unix Shop NOC. A BS/CS, BS/CIS or EECS is desirable. (Dept. DB-104)

STRATUS/TANDEM OPERATORS

These positions involve utilizing tools on Stratus/Tandem and HP and require interaction with vendors and developers. Requires 2-3 years' experience in an NOC environment and at least 2 years' post-high school education. A BS/CS is preferred, as is Unix experience. (Dept. DB-105)

NOC, Unix and Stratus/Tandem Operator positions offer a choice of the following shifts: 6 am-2:30 pm, 9:30 am-5:30 pm, 2:30 pm-11 pm, 5:30 pm-2 am, 11 pm-6 am, 2:30 am-9:30 am. Please indicate shift preference(s) when responding.

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UNIX Administrator

Law School Admission Council (LSAC) is seeking an individual to be responsible for the configuration, administration, and installation of all UNIX systems. Responsibilities will also include implementing/maintaining the computing environment; working with database administrator to monitor/enhance performance of the production and development environment; and developing access security for the physical system. You will also develop capacity and systems requirements/plans; monitor system performance; and work with Information Systems Group (ISG) staff to optimize system performance.

Candidates should have 3 years experience with UNIX and UNIX shell programming along with a thorough understanding of various application and performance/capacity products in a multiple platform environment. Exposure to ORACLE would be a significant asset.

To apply please fax/forward your resume and letter of application to **C. Rommel, Human Resources Office, P.O. Box 40, Newtown, PA 18940. FAX (215) 968-1169.** The application deadline is May 3, 1996.

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• NETWORK MANAGEMENT CONSULTANTS

Your demonstrated expertise in the evaluation, design and implementation of complex network management solutions makes you the ideal candidate for this position. Expertise in UNIX and two or more of the following areas is also required: Sybase database administration (Oracle a plus), C++, project management, operations, help desk workflow analysis, and network management platforms. **Dept. GR/NMC**

• NETWORK SECURITY CONSULTANTS

This position calls on your ability to design and implement network firewall solutions, working with clients to strengthen their overall network security posture. To qualify, you must have in-depth practical knowledge of routers, UNIX, TCP/IP, security threats in a network and computer system environment, and at least one industry-standard firewall tool. **Dept. GR/NSC**

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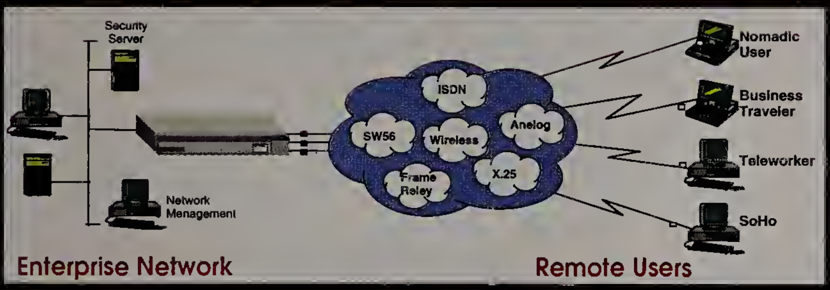

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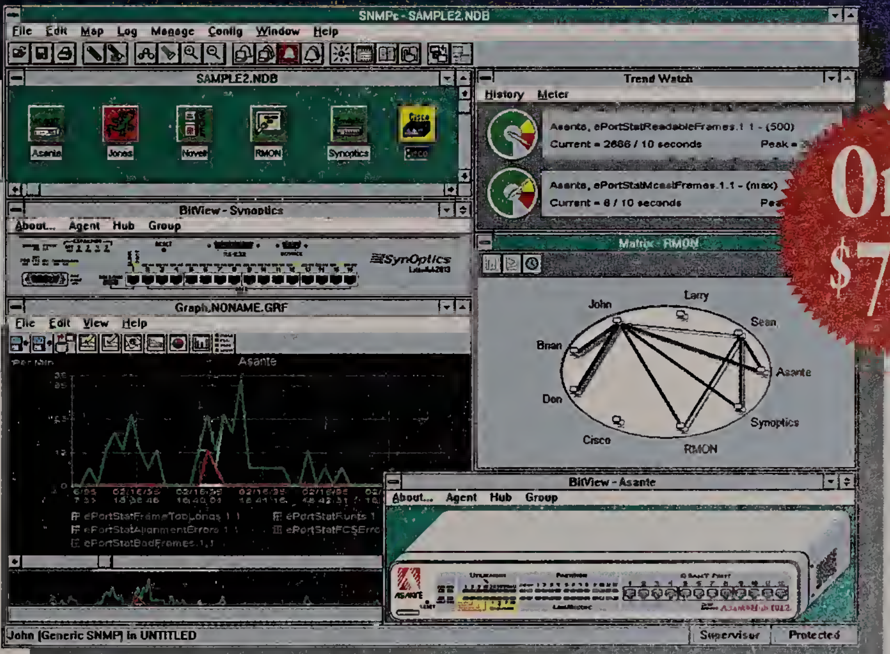

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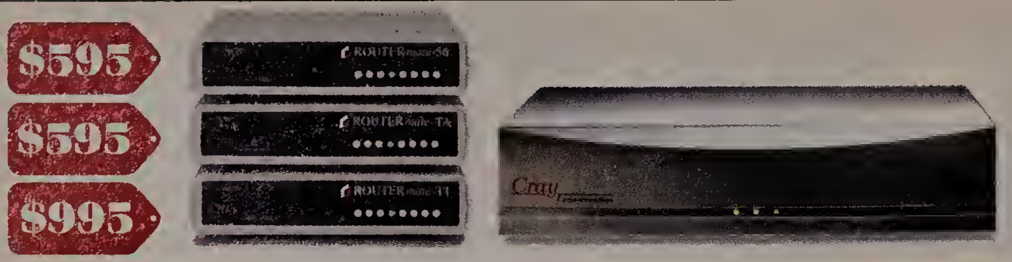

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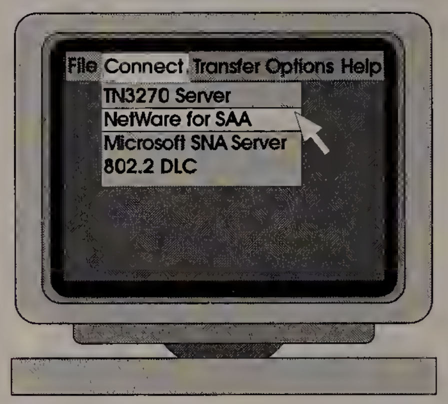

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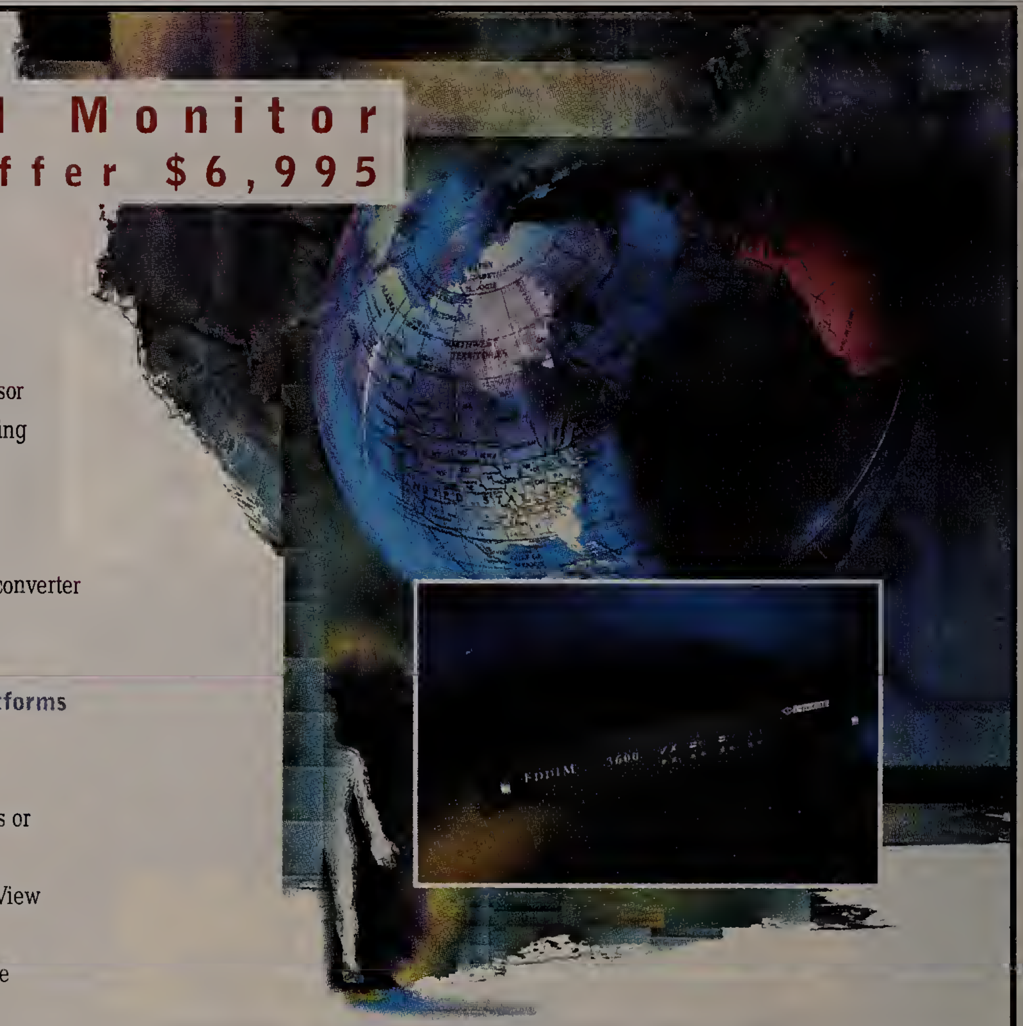

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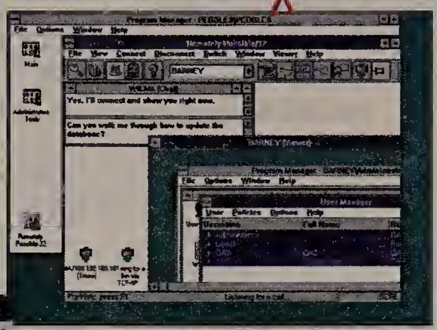

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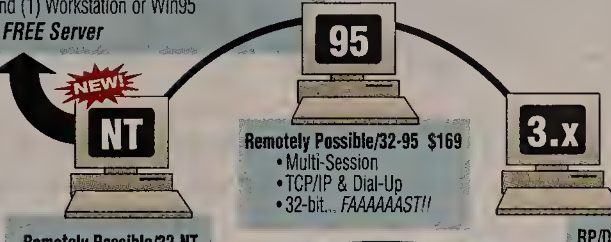

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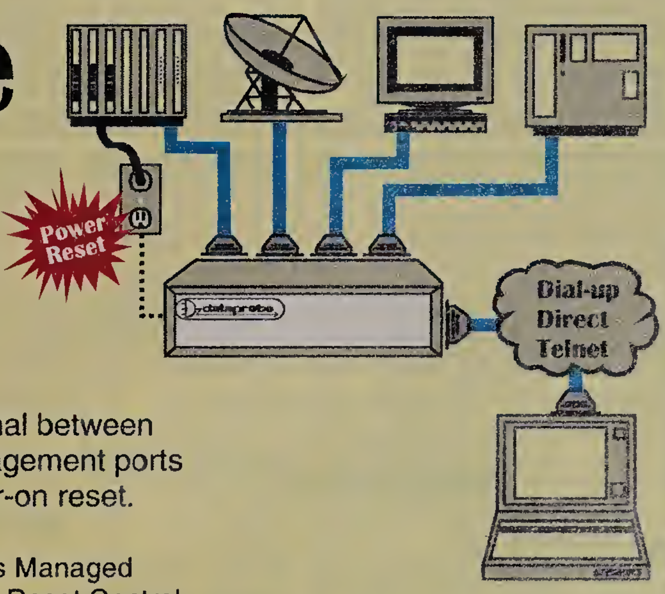

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Lotus

Continued from page 1

nology would hurt us," said Ozzie, who spoke in Paris last week after addressing developers and users at the Lotus European Technology Conference here. If Notes replication becomes a standard, it will actually benefit Lotus by exposing the company's highly regarded replication to more users, Ozzie said.

But Lotus will not go through with the plan unless Microsoft and Netscape pledge that they will not push a rival specification. "Life is too short to get into another standards battle," Ozzie said.

With a spec based on Notes replication, a database vendor could use the spec for its own applications and run it against a variety of other databases, noted Lotus' Ray Ozzie.

Neither Microsoft nor Netscape would comment.

The Notes replication specification is a file identification mechanism that dictates how attributes in a file should be described, Ozzie explained. The specification scheme identifies which attributes of a file have changed after a user or software agent alters it.

The spec provides a blueprint for an object-store database to find changes in a file and communicate a description of those changes to other databases that contain the same file, thus permitting the process of database replication to take place.

Notes was one of the first products to offer built-in replication and has maintained a lead in this area against chief competitors, according to analysts. Notes allows two-way replication between servers and clients, as well as replication at the field level. Neither Microsoft Exchange nor Netscape's Collabra offer that kind of functionality, analysts said.

"Different vendors use different communications mechanisms and different databases to try to do replication," Ozzie said. With a specification based on Notes replication, a database vendor could use the spec for its own applications, and run it against a variety of other databases, he noted.

Good Web fit

Notes' replication technology would translate nicely to the Web, said Eric Brown, an analyst at Forrester Research, Inc. in Cambridge, Mass. "You could use [this kind of replication] to copy only the information on a Web site that has changed, such as a graphics file," he said.

Analysts cautioned there is a large technological step, however, between where Notes replication stands today and a more universal replication standard.

In addition, the process of forming a standard may take years. Lotus has not yet approached standards bodies and key industry players about the specification standard, Ozzie said.

The company, however, is considering working with the World-Wide Web Consortium, based at the Massachusetts Institute of Technology in Cambridge, and at INRIA research centers in France to try to incorporate the replication specification as an extension to HTML, Ozzie said. Lotus will also work with the Internet Engineering Task Force to promote the spec as a file-updating protocol on the Internet.

Ferranti is a correspondent with IDG News Service.

Carriers, users to FCC: Don't go overboard on universal service

By David Rohde

Washington, D.C.

Carriers and user groups have delivered a stern message to the Federal Communications Commission: Stick to the basics.

The message came in reaction to the FCC's suggestion that it authorize subsidies and even mandatory discounts for some users so they can obtain advanced services such as ISDN and Asynchronous Transfer Mode.

These ideas were included in the FCC's proposal to expand universal service under the Telecommunications Act of 1996 (*NW,* March 25, page 19). The new rules are designed to grant special benefits to users in the educational and health care fields while continuing to subsidize rural telephone customers for the high cost of serving them. The rules must be completed by August to become effective by May 1997.

Attorneys for AT&T told the commission to stick to a core set of universal services, such as touch-tone dialing, 911 access and number portability, to "avoid the ballooning of subsidy costs."

Sprint Corp. told the FCC to wait and see which network services gain subscribers among schools and hospitals before designating them for universal service support.

The Ad Hoc Telecommunications Users Committee cautioned the FCC against mandating access to a broad set of services for residential customers. The FCC could consider mandatory Internet access and other items in the future, but only "as technology improves and becomes more ubiquitous," said James Blaszak, attorney for the committee.

Blaszak and others insisted that universal service items must meet a set of four conditions laid out in the act, including one that calls for each item to already be subscribed to by a majority of customers.

The FCC suggested that it could use any one of the four criteria — one merely stating that the network service "meets the public interest, convenience and necessity" — to designate an offering for universal service support.

Several commenters noted that a certain user cost is bound to rise under the new universal service rules, regardless of which services are subsidized.

Because Congress told the FCC to do away with a maze of implicit subsidies that are considered hidden in access charges, the principal explicit funding subsidy — the $6-per-line monthly Subscriber Line Charge (SLC) — is bound to go up, they said.

The Ad Hoc Committee estimated the amount would have to be increased to at least $8.33, reflecting the inflation rate since 1985, when SLCs were implemented. Carriers agreed but said they hoped the net impact on users would be a wash after access charges go down. ■

LDDS

Continued from page 1

LDDS is the fourth largest long-haul provider in the U.S.

The program's most striking feature is a credit equal to a full day's usage for any outage of 30 minutes or more, regardless of where it occurs in the network. The credit is offered across virtually the entire range of LDDS WorldCom services, including outbound voice, inbound toll-free calling, private line, frame relay and even Asynchronous Transfer Mode.

The carrier also gives itself a 22-day limit to install frame relay nodes, roughly half the industry standard of 45 days, with installation time for other services running as low as five days.

What is missing in the WorldMark program is a comprehensive measurement of the actual delivery of data through the network on a bit-by-bit basis. For example, the program does not guarantee successful delivery of a certain percentage — typically 98% or higher — of data in a frame relay network.

LDDS has company

Many other carriers have been offering service-level agreements, particularly since frame relay was judged a basic service by the Federal Communications Commission. But these guarantees are usually limited to one service, are proportional to the period of the outage or average out performance problems over an extended period of time before offering compensation.

"Most of the other frame [relay] deals that I have seen involve monthly measurements," said Ellen Block, a Washington, D.C. attorney who negotiates user contracts with carriers. "[WorldMark] is definitely different.

LDDS WorldCom officials last week were scrambling to place some limits on eligibility for the WorldMark program.

Bryan Neal, an account executive in the carrier's Arlington, Va., office, said the program is designed for the Fortune 100. But company spokeswoman Linda Laughlin said it applies to any new customer.

An MCI spokeswoman said she heard "rumblings" that MCI Communications Corp. would make offers such as WorldMark. But she pointed to the carrier's recent tariffed guarantee — available to all comers — of a 99% delivery rate of frames on permanent virtual circuits with no preestablished committed information rate. Sprint Corp. offers a guarantee at 98%.

AT&T does not offer a throughput guarantee, but it does offer credits for frame relay outages equal to the value of the time lost, said an AT&T spokesman. And AT&T offers a credit for private-line outages equal to 5% of the user's monthly charge for every hour of service lost.

What's more, Block noted that AT&T typically takes responsibility for the local loop in its guarantees when users buy access lines off AT&T's access tariff, though that typically includes a markup over the local exchange carrier's charge.

By contrast, MCI and Sprint specifically exclude local-loop outages from their frame guarantees (*NW,* Feb. 12, page 72).

On the voice side, Block said LDDS WorldCom had hit on something of special interest to network administrators managing mission-critical call centers generating revenue for their companies. The WorldMark program offers a full day's credit on 800 usage — not only for garden-variety outages, but also for a raft of other benchmarks: two hours to activate a new call-routing feature and one hour to reconfigure a feature.

Senior Editor Joanie Wexler contributed to this story.

No excuses, voice or data

Sample guarantees under LDDS WorldCom's WorldMark program for new customers:

Product	Guaranteed Installation interval	Compensation for failure to meet It	Guaranteed outage restoration interval	Compensation for failure to meet it
Private line	18 business days	1 month's charge, plus installation fee	30 minutes	1 day's charge
Frame relay	22 business days	1 day's access, plus permanent virtual circuit (PVC) charges per affected node	30 minutes	1 day's access, plus PVC charges per affected node
Toll-free service	5 business days	1 day's average usage	30 minutes	1 day's average usage

Toll-free program also guarantees 1-day installation for an additional phone number, 1 hour for feature reconfiguration and 30 minutes for a predefined call center routing change.

IBM

Continued from page 1

software,'' said William Duncan, manager of enterprise communications brand software in IBM's Networking Software Division. Whereas 3270 and 5250 nets have relied on SNA in the past, they will now support IP traffic more easily, he said.

IBM estimates that more than 50% of its SNA users will need Internet or intranet access in the next 12 months.

But with more than $20 trillion invested in SNA applications and about 40,000 SNA networks worldwide, users are not quite ready to rip out their SNA nets just yet.

IBM will add an Internet browser capability to its Personal Communications line of 5250 and 3270 terminal emulation programs, which provide PC access to host resources. The browser, based at least initially on IBM technology, will let PCs in terminal emulation mode access Web resources directly.

The company also plans to add Internet capabilities for dumb 3270 and 5250 terminals via an HTML gateway. The gateway will convert 3270 or 5250 datastreams into HyperText Transfer Protocol to call up Internet or intranet hosts.

"The trick will be to get the text-based glass terminal 3270 and 5250 users access to graphics-based data via the Internet,'' said Frank Dzubeck, president of the Communications Network Architects, Inc. consultancy in Washington, D.C. "It may open the world of legacy applications to the Internet and make for killer intranet capabilities.''

The Internet/intranet enhancements are part of the ongoing revamping of IBM's software line, which began last month with the introduction of its Software Server line, previously dubbed the Eagle project (*NW*, March 18, page 1). The seven-member Software Server family integrates over 70 products into about 16 configurations.

Users are looking forward to a single package that will enable host emulation and Internet browser capabilities.

SNA SOFTWARE STILL SOARING

1995 shipments of SNA client software totaled 4.7 million units, a 22% increase over 1994, according to market research firm IDC in Framingham, Mass. An additional 5.38 million packages will be sold in 1996, according to IDC.

"As we distribute our networking resources farther out, the ability to have an all-encompassing communications package that we can centrally monitor and control will go a long way to reduce our support costs,'' said Paul McManus, director of application development with Apria Healthcare Group, Inc. in Costa Mesa, Calif. "We are just beginning to build an intranet and are deploying Lotus Notes, so the idea of having access to all of those resources simultaneously will give us a lot of power.''

By the third quarter, Notes is expected to support major Web technologies such as HTML, Java and JavaScript. So with HTML and other Web protocol support, 5250 and 3270 users should be able to participate in the same environments.

IBM is also looking to extend Distributed Computing Environment security and directory products so they can be used in Internet and intranet environments.

"The idea is that users could centrally manage and provide access to a wide variety of resources distributed around their enterprise environments,'' said Phyllis Byrne, vice president of distributed systems services for IBM. "There is no central directory for Internet or intranet access, and we want to provide that capability.''

Separately, IBM has the following developments in the works:

■ A new version of Novell, Inc.'s NetWare for SAA gateway, which is developed by IBM and sold by both companies, will support IBM's Advanced Peer-to-Peer Networking technology. IBM also will more tightly couple the gateway with LU 6.2-based programs.

■ Enhanced AnyNet features, which are now embedded in IBM's server and client software packages, will include support for NETBIOS and IPX over SNA and TCP/IP backbones. Today, AnyNet lets SNA data flow over TCP/IP and vice versa. ■

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ADSL

Continued from page 1

devices have been consulting with telephone companies about how to handle the bandwidth load ADSL would dump on carrier networks.

The possibilities are enormous. Supported by the proper gear, users could divvy up ADSL bandwidth at the data level to allow multiple traffic types over the same line, analogous to the flexibility of channelized T-1s, according to Alan Stewart, principal with Network Interface Corp. in Crystal Lake, Ill.

An ADSL stream consists of seven channels, some of which could be circuit-switched and some packet-switched, said Daniel Briere, president of the TeleChoice, Inc. consultancy in Verona, N.J.

And the price could be less than what a T-1 costs.

While industry players say initial offerings will focus on telecommuting and Internet access, they are working on more. For example, Roderick Randall, vice president of WAN access technology for Madge, said his company's switches lend themselves to supporting ADSL services over the same phone line with a switched ISDN service.

That would offer users virtually anywhere high-bandwidth dedicated access to the Internet or a corporate LAN, for example. It also could provide dial-up access via ISDN for remote access to any number of sites.

"What you're seeing here is a major, major trend to offer bandwidth to the home,'' Briere said.

Plenty of variety

The standard for ADSL calls for delivering 6.1M bit/sec downstream and 640K bit/sec upstream over 12,000 feet of 24-gauge wire — the potential of broadband service over most of today's standard phone lines. Each ADSL line also includes a regular analog phone channel, which is left clear since ADSL taps frequencies above those used for voice calls.

Vendors are tinkering with other flavors. Symmetric Digital Subscriber Line, or SDSL, promises a full 1.5M bit/sec in both directions. And, while still in its infancy, Very high speed Digital Subscriber Line, or VDSL, promises a breathtaking 52M bit/sec downstream and 6.4M bit/sec upstream over 1,000 feet. This is intended as the last link to the user in fiber-to-the-curb broadband carrier networks.

Fair price?

When regulators look at the bandwidths offered and then see the price of ADSL, they may look askance at rates of $800 to $1,000 per month for a T-1 line offering similar bandwidth, Briere said.

If users want regulators to jump in, they should protest. "The challenge would be, 'These things look alike. Why are they two different prices?' '' said Colleen Boothby, a Washington, D.C. attorney specializing in telecommunications law.

At the very least, users should squawk to their carriers, she said.

Despite its possibilities, commercial ADSL services are limited today. Bell Atlantic Corp. is using ADSL to bring video on demand to Fairfax County, Va., and Dover Township, N.J. Internet access service from US WEST or GTE Corp., both of which are trialing the technology, is still just a possibility.

The service requires a modem at the user's premise and at the phone company's central office. Telephone companies need a way to consolidate access so they do not have banks of individual modems. Ameritech Corp. has put out a request for a Digital Subscriber Line Access Multiplexer to do that.

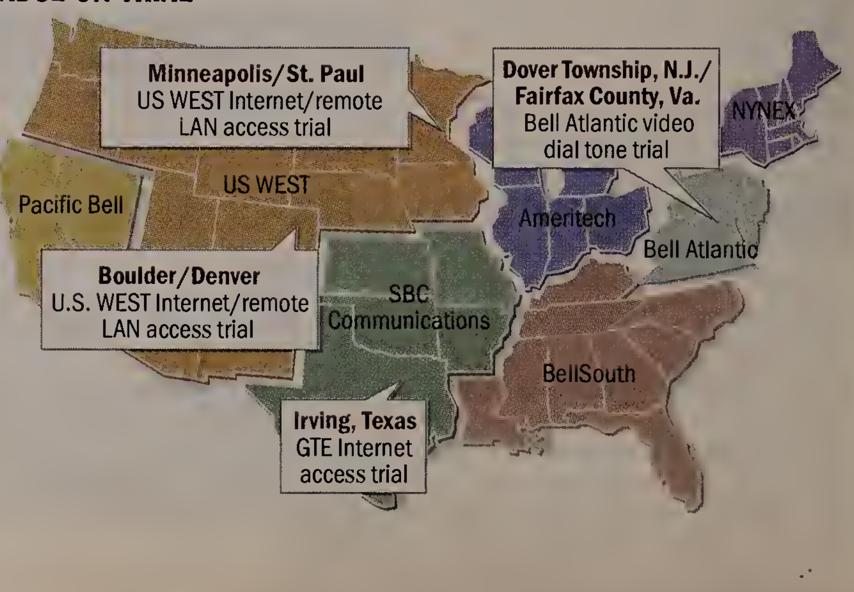
"What are the metrics of establishing that kind of network? What kind of buffering and flow control algorithms are going to be use?'' asked Bernie Schneider, Ascend's vice president of marketing.

Carriers also need to work out how their network backbones would handle all the traffic that widespread access at T-1 speed and above would create.

In addition, they have to worry about how ADSL would affect existing services, particularly ISDN, a technology that tied up enormous investment but which has not yet paid off.

A lower price for ADSL modems and a strong showing by high-speed cable modems also would spur deployment of ADSL. ■

ADSL ON TRIAL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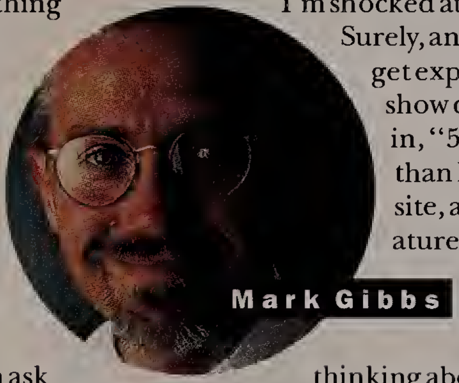
Do Webmasters get it? Opportunity doesn't usually come knocking

I didn't think I could be surprised by anything on the 'Net, but I have been. And what surprised me? The attitudes of many Webmasters.

Other than writing for this august organ, I write books, do power lunches and consult. My consulting clients include an array of organizations that range from end users to vendors.

Now one of my long-term clients is Hitachi Computer Products. These guys have a product coming out on free beta release called Zooworks (check out www.zoosoft.com). The product is a personal proxy server that runs in your PC and handles all requests for Web pages on your behalf. As the pages come in from a server, a database engine indexes the contents and creates a database so you can do "reverse lookups."

A reverse lookup differs from a forward lookup (the kind of thing you do with Yahoo or Alta Vista) in that the former allows you to find what you've already seen while the latter makes it possible to find what you haven't yet seen. Thus, when the question "Where did I see something about goldfish last week?" comes up, you can ask Zooworks. Very clever.



Mark Gibbs

Now, as a way of building awareness of the product, we decided that a competition on the Internet was in order. We're going to have 10 "chains" of 10 questions each with a prize at the end of each chain. And if you can answer the 101st question, there's a gonzo great prize.

Lest this sound like a blatant advertisement for my clients, let me get to the point: To whit, why are most Webmasters so...err, um, well...unaware?

To understand my criticism, you need to appreciate the architecture of the contest. We were looking for 100 Webmasters to let us hide the Zooworks logo at their site. Find the logo, and you'll be able to link to the next question.

I'm expecting the sites involved will see several thousand hits in the space of a week — not a bad way of getting increased exposure for free.

So why is it that when I polled Webmasters at every major airline, I got back only two acknowledgments that my inquiry would be dealt with (presumably along with my luggage, but I digress)?

Surely, any Web site that doesn't get exposure should make its Webmaster think about job security.

And why is it that Detroit completely ignored the offer? Not one of the car manufacturers' Webmasters responded..

And why is it that several Webmasters turned down my offer on the basis that Zooworks won't support the Macintosh until later this year (the current lack of Mac support has nothing to do with the value of promoting your Web site).

I'm close to my target of 100 sites, but I'm shocked at the poor response. Surely, any Web site that doesn't get exposure and doesn't show quantifiable value — as in, "5,000 people more than last week looked at our site, and 500 asked for literature to be sent" — should make any Webmaster with a grain of self-preservation start thinking about job security. Just remember, at present, Webmasters are an expensive luxury in most organizations.

What it points to is that not only are Webmasters deficient in their willingness to grasp opportunity, but the people who should be concerned about exposure — that is, marketing, sales and management groups — are either not aware of the value of a successful Web site or aren't involved in the management and direction of their Internet offering.

My recommendation is that if you are responsible for the operation and management of a Web site, you shouldn't let an opportunity for exposure pass you by. Remember, it only takes one person to see your site and care. That person will probably tell many others, who also may care, and your site could well be one of the most effective marketing vehicles you have in the long term.

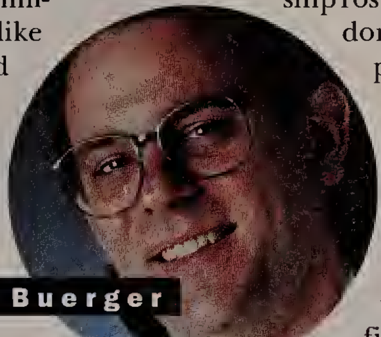
Are you promoting your Web site? Tell Gibbs how at mgibbs@gibbs.com or (800) 622-1108, Ext. 504. Next week, "How safe do you want to be?" revisited.

Is there a Hitchcockian surprise in virus suspense?

Staring from my office wall is a black-and-white photograph of Alfred Hitchcock. His bulbous face is balanced by a bird from the famous movie perched on a huge cigar clenched in Hitchcock's mouth. His formula to stir fear was simple: "There is no terror in a bang, only in the anticipation of it."

The master of suspense used this technique to scare the socks off millions of film viewers. Films like *The Birds* actually contained little violence. Overkill would have spoiled the suspense.

Computer viruses have long presented network managers with a similar sense of suspense. Everyone (especially the press) warns of dreaded infections, but relatively few stories surface about actual death and mayhem.



Dave Buerger

That's why I was skeptical when two vendors that sell antivirus software independently pitched me to write about another network-based epidemic — namely, viruses that infest systems through word processor macros.

Everyone warns of dreaded infections, but relatively few stories surface about actual death and mayhem.

Macro viruses are deceptively simple. The virus creator writes a macro, or script of instructions, and places it into a word processing document. The file is passed around as an E-mail attachment. A recipient's word processor automatically executes the macro's instructions when the file is opened. The process is so smooth that users are hit before they know it.

Most macro viruses are benign, such as displaying a dialogue box or a message. Nefarious hackers are just starting to embed instructions to delete files or perform other mischief. (For a summary of known macro viruses, see www.anet.cz/alwil/wwmac1.htm.)

Either way, cleaning up the mess can be a time-consuming hassle and cost thousands of dollars in downtime if lots of PCs are infected.

The two vendors that called me — ON Technology, Inc. and Trend Micro Devices, Inc. — say that infestation by macro viruses is rising fast. Both cited a recent study by the National Computer Security Association (NCSA) as evidence to back their claim.

The NCSA, founded in 1989, had an early reputation as a shill for antivirus software vendors. It has since cleaned up its act. The organization claims 95% of Fortune 500 companies on its membership roster, along with about 18 vendors that sell security-related products. The NCSA's lab certifies security products and does research, such as a regular survey on computer virus prevalence.

Its recent national survey (available at www.ncsa.com) predictably finds that the occurrence of viruses is growing. The NCSA says 90% of large organizations experience a virus encounter once a month. It predicts one infestation chance per 100 PCs per month this year.

The most startling news is that macro-type viruses, such as Word.concept, are three to four times more prevalent than traditional boot-track viruses. Last winter, Word.concept infected a third of survey sites and caused half of all virus encounters. Word.concept was discovered in the summer of 1995.

"Macro viruses are growing fast because they travel faster over networks than by diskette," said Peter Tippett, president of the NCSA. Diskettes still comprise the primary virus delivery vehicle, but electronic transmissions are taking over, according to Tippett and other experts.

Microsoft Corp. released tools to help protect Word users from Word.concept (see article Q134727 at www.microsoft.com).

Microsoft disowned the problem, however, stating that for true protection, "you must install software specifically designed to detect viruses."

Other vendors that sell virus detection software include Cheyenne Software, Inc., McAfee and Symantec Corp.

The NCSA's survey offers evidence that the suspense about virus infections has a real basis. Network managers can ease their malaise by investing in and using antivirus software. Hopefully, this will help avert Hitchcockian surprises.

Buerger is a networking industry consultant and writer in Atlanta. He can be reached at dave@buerger.com.

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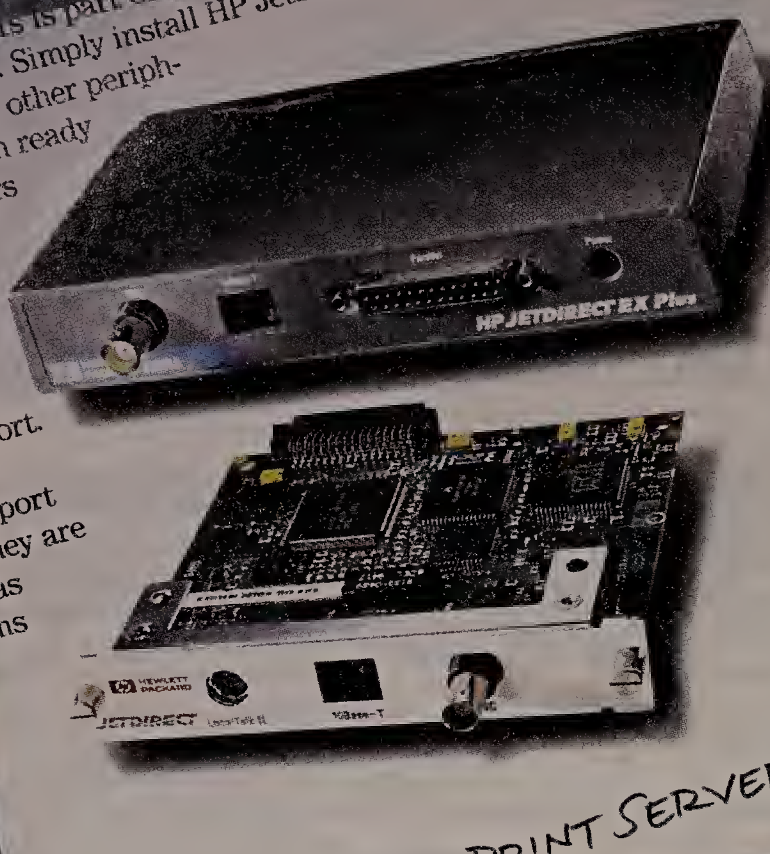

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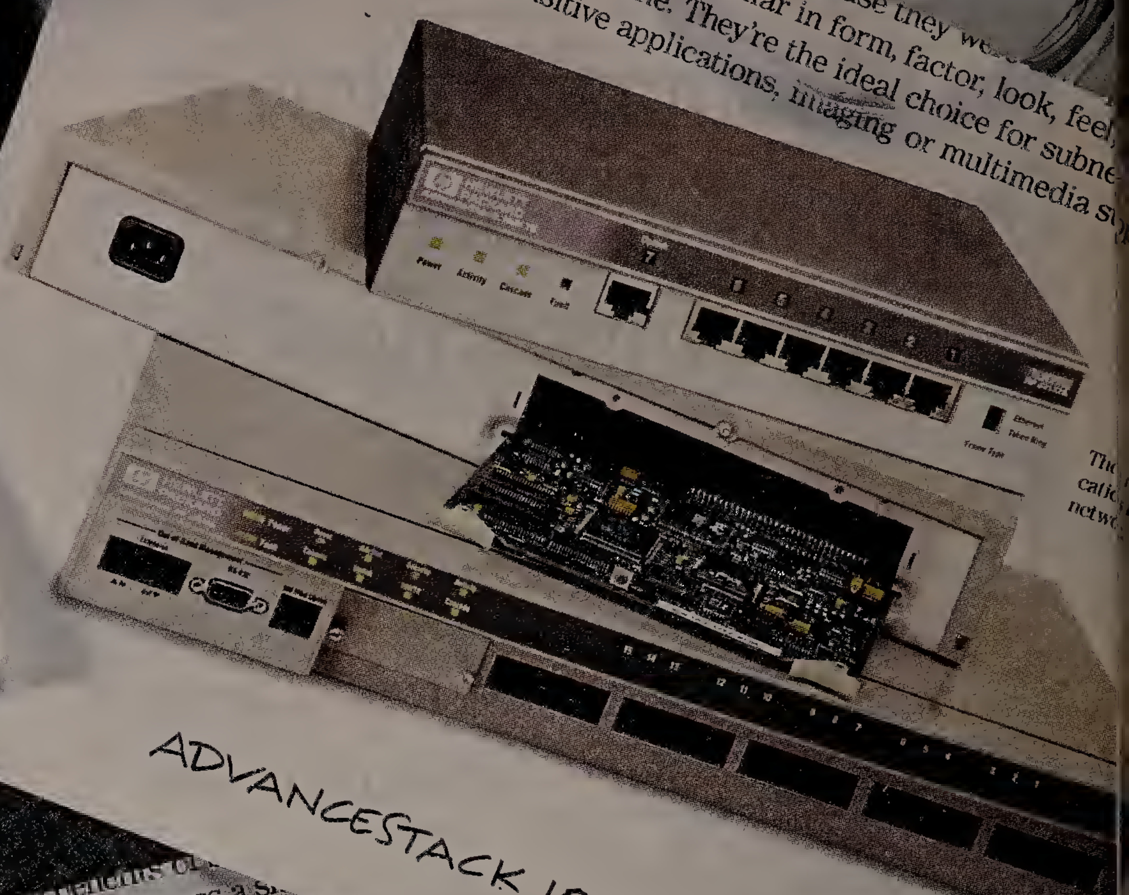

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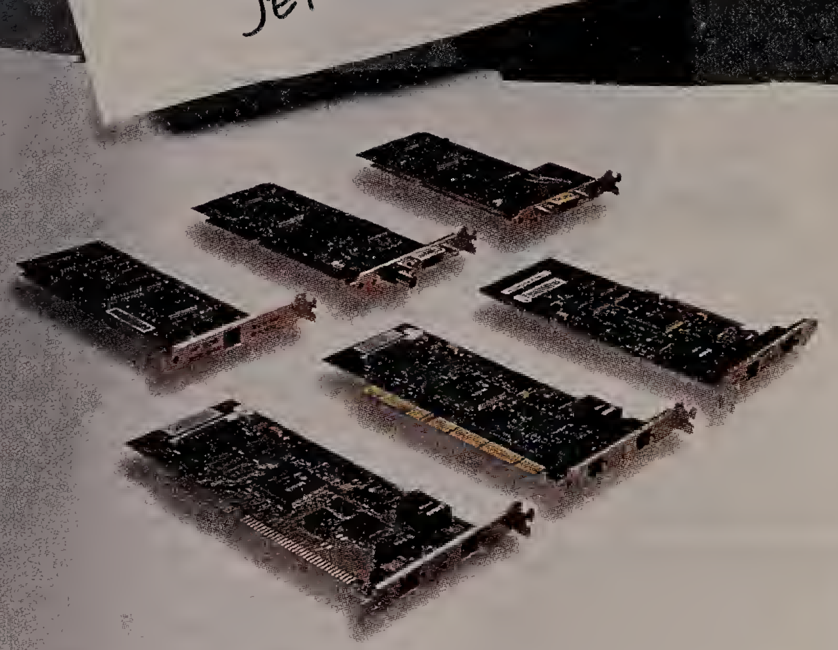

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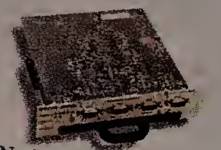

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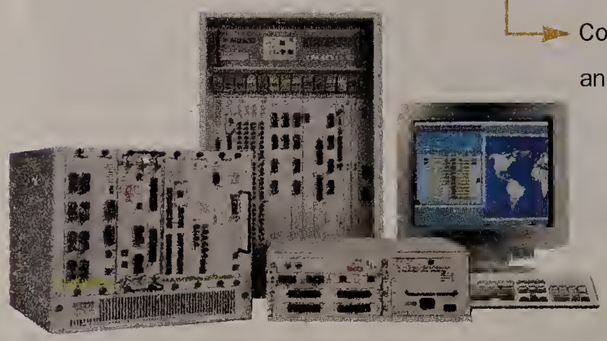

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1 Industry: (check one only)

01. ☐ Manufacturers (other)
02. ☐ Finance/Banking
03. ☐ Insurance/Real Estate/Legal
04. ☐ Health Care Services
05. ☐ Hospitality/Entertainment/Recreation
06. ☐ Media/TV/Cable/Radio/Print
07. ☐ Retail/Wholesale Trade/Business Services
08. ☐ Transportation
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10. ☐ Education
11. ☐ Process Industries (Mining/Construction/Petroleum Refining/Agriculture/Forestry)
12. ☐ Government (Federal/State/Local)
13. ☐ Military
14. ☐ Aerospace
15. ☐ Consultants (Independent)
16. ☐ Carriers/Interconnects
17. ☐ Manufacturers (Computer/Communications)
18. ☐ Resellers of Computer/Network Products (VARs, VADs, Distributors)
19. ☐ Systems/Network Integrators
20. ☐ Distributors (Computer/Communications)
21. ☐ Other *(please specify)*____________

2 What is your job function?

(check one only)

NETWORK IS MANAGEMENT:
1. ☐ Networking Management
2. ☐ LAN Management
3. ☐ Datacom/Telecom Management
4. ☐ IS, IT, MIS, Systems Management
5. ☐ Engineering Management
6. ☐ Corporate Management (CIO, CEO, Pres., VP, Dir., Mgr., Financial Management)
7. ☐ Consultant (Independent)
8. ☐ Other *(please specify)*____________

3 What is the total number of sites for which you have purchase influence? (check one only)

1. ☐ 100+
2. ☐ 50 - 99
3. ☐ 20 - 49
4. ☐ 10 - 19
5. ☐ 2 - 9
6. ☐ 1
7. ☐ None

4 What is your scope and involvement in purchasing decisions for network products & services for your enterprise?

A. SCOPE
(check one only)
1. ☐ Corporate/Enterprise
2. ☐ Department
3. ☐ None

B. INVOLVEMENT
(check all that apply)
1. ☐ Recommend/Specify
2. ☐ Approve
3. ☐ Evaluate
4. ☐ Determine the need
5. ☐ None

5 Check ALL that apply in Columns A and B:

A. I am involved in the purchase of the following products/services:

B. I plan to purchase the following products/services:

A B
☐ 100 ☐ **LOCAL-AREA NETWORKS**
☐ 01. ☐ Local-Area Networks
☐ 02. ☐ Network Op. Sys. Software
☐ 03. ☐ LAN Storage/Backup
☐ 04. ☐ Optical LAN Storage/Backup
☐ 05. ☐ Disk LAN Storage/Backup
☐ 06. ☐ Tape LAN Storage/Backup
☐ 07. ☐ RAID LAN Storage/Backup
☐ 08. ☐ Network Test/Diagnostic Tools
☐ 09. ☐ Cables, Connectors, Baluns
☐ 10. ☐ UPS
☐ 11. ☐ Network Interface Cards
☐ 12. ☐ Peer-to-Peer LANs
☐ 13. ☐ SNMP Network Management
☐ 14. ☐ ATM Switches
☐ 15. ☐ Token-Ring Switches
☐ 16. ☐ Ethernet Switches
☐ 17. ☐ Remote LAN Access/Communications Servers
☐ 18. ☐ Superservers
☐ 19. ☐ File/Application Servers
☐ 20. ☐ Print Servers

A B
☐ 101 ☐ **INTERNETWORKING**
☐ 21. ☐ Bridges
☐ 22. ☐ Routers
☐ 23. ☐ Bridge/Router
☐ 24. ☐ Gateways
☐ 25. ☐ Intelligent Hubs/Stackables

A B
☐ 102 ☐ **COMPUTERS/PERIPHERALS**
☐ 26. ☐ Laptops/Notebooks/Sub-Notebooks
☐ 27. ☐ Micros/PCs
☐ 28. ☐ Minis
☐ 29. ☐ Mainframes
☐ 30. ☐ Workstations
☐ 31. ☐ Terminals
☐ 32. ☐ Printers
☐ 33. ☐ Cluster Controllers
☐ 34. ☐ Monitors
☐ 35. ☐ Fax/Modem Boards

A B
☐ 103 ☐ **REMOTE/WIRELESS COMPUTING**
☐ 36. ☐ PDAs
☐ 37. ☐ PCMCIA Devices
☐ 38. ☐ Wireless Data Services
☐ 39. ☐ Wireless Data Equipment
☐ 40. ☐ Wireless LANs
☐ 41. ☐ Cellular Equipment & Services

A B
☐ 104 ☐ **INTERNET/ELECTRONIC COMMERCE**
☐ 42. ☐ Internet Access Providers
☐ 43. ☐ Firewalls
☐ 44. ☐ Web Servers/Browsers
☐ 45. ☐ Internet Software Tools

A B
☐ 105 ☐ **SOFTWARE/APPLICATIONS**
☐ 46. ☐ Network Management
☐ 47. ☐ Systems Management
☐ 48. ☐ Security
☐ 49. ☐ Communications Software
☐ 50. ☐ Terminal Emulation
☐ 51. ☐ Word Processing
☐ 52. ☐ Operating Systems
☐ 53. ☐ Client/Server Applications Development

A B
☐ ☐ **SOFTWARE/APPLICATIONS (cont'd)**
☐ 54. ☐ Database Management/RDBMS
☐ 55. ☐ Spreadsheet
☐ 56. ☐ Groupware
☐ 57. ☐ ED1
☐ 58. ☐ E-mail
☐ 59. ☐ Windows/Graphical User Interface
☐ 60. ☐ Multimedia
☐ 61. ☐ Graphics/DTP
☐ 62. ☐ Remote Access
☐ 63. ☐ Imaging
☐ 64. ☐ Suites
☐ 65. ☐ Middleware
☐ 66. ☐ Document Management
☐ 67. ☐ Database Server
☐ 68. ☐ Site Metering Tools
☐ 69. ☐ Computer-Integrated Telephony (CIT)

A B
☐ 106 ☐ **WIDE-AREA NETWORK EQUIPMENT & SERVICES**
☐ 70. ☐ Frame Relay Equip./Services
☐ 71. ☐ Modems
☐ 72. ☐ FT-1/T-1/T-3 Multiplexers
☐ 73. ☐ FT-1/T-1/T-3 Services
☐ 74. ☐ SONET
☐ 75. ☐ Inverse Multiplexers
☐ 76. ☐ SMDS
☐ 77. ☐ Asynchronous Transfer Mode
☐ 78. ☐ Diagnostic/Test Equipment
☐ 79. ☐ DSU/CSU
☐ 80. ☐ VSAT/Satellite
☐ 81. ☐ ISDN Equipment & Services
☐ 82. ☐ PBXs
☐ 83. ☐ Voice Mail/Response
☐ 84. ☐ Videoconferencing
☐ 85. ☐ Leased Lines
☐ 86. ☐ Switched Data
☐ 87. ☐ E-mail/On-line Services
☐ 88. ☐ 800/900/MTS Services
☐ 89. ☐ Virtual Networks
☐ 90. ☐ Outsourcing/Systems Integration Services
☐ 91. ☐ Education/Training Services

☐ 92. ☐ None of the above (1-91)

6 What is the total number of LANs, workstations/nodes at this location/in your organization?

At this location:			Entire organization:		
	LANs	Workstations/ Nodes		LANs	Workstations/ Nodes
1.	☐ 5,000+	☐	1.	☐ 5,000+	☐
2.	☐ 1,000-4,999	☐	2.	☐ 1,000-4,999	☐
3.	☐ 100-999	☐	3.	☐ 100-999	☐
4.	☐ 50-99	☐	4.	☐ 50-99	☐
5.	☐ 10-49	☐	5.	☐ 10-49	☐
6.	☐ 1-9	☐	6.	☐ 1-9	☐

7 Check ALL that apply in Columns A and B:

A. The following network platforms are currently installed:

B. The following network platforms are planned for purchase:

A B
☐ SS ☐ **NETWORK ARCHITECTURES**
☐ 01. ☐ SNA
☐ 02. ☐ DECnet

A B
☐ ☐ **NETWORK ARCHITECTURES (cont'd)**
☐ 03. ☐ TCP/IP
☐ 04. ☐ Novell IPX/SPX
☐ 05. ☐ APPC/APPN/LU 6.2
☐ 06. ☐ NETBIOS
☐ 07. ☐ AppleTalk
☐ 08. ☐ NFS
☐ 09. ☐ Other *(please specify)*____________

A B
☐ 56 ☐ **NETWORK OPERATING SYSTEM**
☐ 10. ☐ Microsoft (LAN Manager)
☐ 11. ☐ Novell (NetWare 2.X, 3.X)
☐ 12. ☐ Novell (NetWare 4.X)
☐ 13. ☐ Windows NT
☐ 14. ☐ Windows NT/Advanced Server
☐ 15. ☐ LocalTalk (AppleTalk)
☐ 16. ☐ Banyan (VINES)
☐ 17. ☐ IBM (LAN Server)
☐ 18. ☐ IBM (PC LAN Program)
☐ 19. ☐ Artisoft (LANtastic)
☐ 20. ☐ Digital (Pathworks)
☐ 21. ☐ Other *(please specify)*____________

A B
☐ S7 ☐ **LAN ENVIRONMENT**
☐ 22. ☐ 4M Token Ring
☐ 23. ☐ 16M Token Ring
☐ 24. ☐ Ethernet
☐ 25. ☐ 100M Ethernet
☐ 26. ☐ StarLAN
☐ 27. ☐ FDDI
☐ 28. ☐ LocalTalk
☐ 29. ☐ 10Base-T
☐ 30. ☐ ATM
☐ 31. ☐ Other *(please specify)*____________

A B
☐ S8 ☐ **COMPUTER OPERATING SYSTEM**
☐ 32. ☐ DOS
☐ 33. ☐ Unix/Xenix/AIX
☐ 34. ☐ OS/2
☐ 35. ☐ OS/2 Warp
☐ 36. ☐ IBM MVS
☐ 37. ☐ IBM VM
☐ 38. ☐ Digital VMS
☐ 39. ☐ Macintosh
☐ 40. ☐ Windows
☐ 41. ☐ Windows 95
☐ 42. ☐ X Window System
☐ 43. ☐ Solaris
☐ 44. ☐ Other *(please specify)*____________

☐ 45. ☐ None of the above (1-44)

8 For which areas outside of North America do you have purchase influence? (check all that apply)

1. ☐ Europe
2. ☐ Asia
3. ☐ South America
4. ☐ Australia
5. ☐ Middle East
6. ☐ None

9 Do you have or plan to install client/server networks?

☐ Yes ☐ No

10 Which of the following hardware platforms are installed/planned in your company? (check all that apply)

Mainframes	A Installed	B Planned
1. IBM	☐	☐
2. Amdahl	☐	☐
3. Cray	☐	☐
4. Hitachi	☐	☐
5. Unisys	☐	☐

Minis	C Installed	D Planned
1. IBM	☐	☐
2. Digital	☐	☐
3. Tandem	☐	☐
4. Unisys	☐	☐
5. AT&T GIS	☐	☐
6. HP	☐	☐
7. Data General	☐	☐

Which of the following do you have installed/planned: (USE NUMBERS ONLY)

	At this location:		Entire organization:	
	E Servers	F Clients/Nodes	G Servers	H Clients/Nodes
1. Power PC				
2. Power Macintosh				
3. Macintosh (Other)				
4. Pentium-based				
5. 80486-based				
6. 80386-based				
7. 80286-based				
8. RISC-based workstations				
9. Other				

Ⓐ

11 What is the estimated value of networking equipment and services that you help specify, recommend or approve annually? (check one only)

01. ☐ $100 million or more
02. ☐ $50 mil. - $99.9 mil.
03. ☐ $25 mil. - $49.9 mil.
04. ☐ $20 mil. - $24.9 mil.
05. ☐ $10 mil. - $19.9 mil.
06. ☐ $5 mil. - $9.9 mil.
07. ☐ $1 mil. - $4.9 mil.
08. ☐ $500,000 - $999,999
09. ☐ $250,000 - $499,999
10. ☐ $249,999 or less
11. ☐ None of the above

12 Estimated gross annual revenue of your entire company/ institution:

(check one only)

1. ☐ $10 billion or more
2. ☐ $1 bil. to $9.9 bil.
3. ☐ $500 mil. to $999.9 mil.
4. ☐ $100 mil. to $499.9 mil.
5. ☐ $50 mil. to $99.9 mil.
6. ☐ $10 mil. to $49.9 mil.
7. ☐ $5 mil. to $9.9 mil.
8. ☐ $4.9 mil. or less
9. ☐ None of the above

13 Estimated number of employees at this location/in entire organization:

At this location:	Entire organization:
1. ☐ Over 10,000	1. ☐ Over 10,000
2. ☐ 5,000 - 9,999	2. ☐ 5,000 - 9,999
3. ☐ 2,500 - 4,999	3. ☐ 2,500 - 4,999
4. ☐ 1,000 - 2,499	4. ☐ 1,000 - 2,499
5. ☐ 500 - 999	5. ☐ 500 - 999
6. ☐ 499 or less	6. ☐ 499 or less

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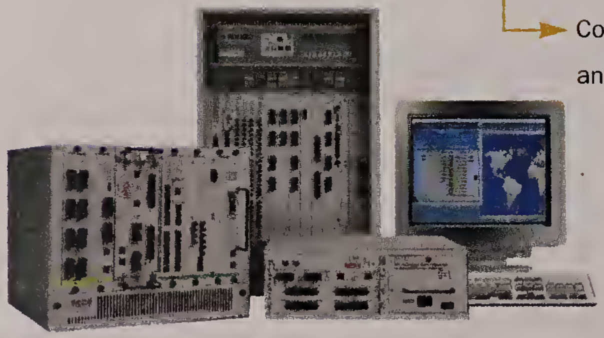

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9501

1 Industry: (check one only)

01. ☐ Manufacturers (other)
02. ☐ Finance/Banking
03. ☐ Insurance/Real Estate/Legal
04. ☐ Health Care Services
05. ☐ Hospitality/Entertainment/Recreation
06. ☐ Media/TV/Cable/Radio/Print
07. ☐ Retail/Wholesale Trade/Business Services
08. ☐ Transportation
09. ☐ Utilities
10. ☐ Education
11. ☐ Process Industries (Mining/Construction/Petroleum Refining/Agriculture/Forestry)
12. ☐ Government (Federal/State/Local)
13. ☐ Military
14. ☐ Aerospace
15. ☐ Consultants (Independent)
16. ☐ Carriers/Interconnects
17. ☐ Manufacturers (Computer/Communications)
18. ☐ Resellers of Computer/Network Products (VARs, VADs, Distributors)
19. ☐ Systems/Network Integrators
20. ☐ Distributors (Computer/Communications)
21. ☐ Other *(please specify)* ________

2 What is your job function? (check one only)

NETWORK IS MANAGEMENT:

1. ☐ Networking Management
2. ☐ LAN Management
3. ☐ Datacom/Telecom Management
4. ☐ IS, IT, MIS, Systems Management
5. ☐ Engineering Management
6. ☐ Corporate Management (CIO, CEO, Pres., VP, Dir., Mgr., Financial Management)
7. ☐ Consultant (Independent)
8. ☐ Other *(please specify)* ________

3 What is the total number of sites for which you have purchase influence? (check one only)

1. ☐ 100+
2. ☐ 50 - 99
3. ☐ 20 - 49
4. ☐ 10 - 19
5. ☐ 2 - 9
6. ☐ 1
7. ☐ None

4 What is your scope and involvement in purchasing decisions for network products & services for your enterprise?

A. SCOPE (check one only)	B. INVOLVEMENT (check all that apply)
1.☐ Corporate/Enterprise	1.☐ Recommend/Specify
2.☐ Department	2.☐ Approve
3.☐ None	3.☐ Evaluate
	4.☐ Determine the need
	5.☐ None

5 Check ALL that apply in Columns A and B:

A. I am involved in the purchase of the following products/services:
B. I plan to purchase the following products/services:

A B

☐ 100 ☐ **LOCAL-AREA NETWORKS**
☐ 01. ☐ Local-Area Networks
☐ 02. ☐ Network Op. Sys. Software
☐ 03. ☐ LAN Storage/Backup
☐ 04. ☐ Optical LAN Storage/Backup
☐ 05. ☐ Disk LAN Storage/Backup
☐ 06. ☐ Tape LAN Storage/Backup
☐ 07. ☐ RAID LAN Storage/Backup
☐ 08. ☐ Network Test/Diagnostic Tools
☐ 09. ☐ Cables, Connectors, Baluns
☐ 10. ☐ UPS
☐ 11. ☐ Network Interface Cards
☐ 12. ☐ Peer-to-Peer LANs
☐ 13. ☐ SNMP Network Management
☐ 14. ☐ ATM Switches
☐ 15. ☐ Token-Ring Switches
☐ 16. ☐ Ethernet Switches
☐ 17. ☐ Remote LAN Access/Communications Servers
☐ 18. ☐ Superservers
☐ 19. ☐ File/Application Servers
☐ 20. ☐ Print Servers

A B

☐ 101 ☐ **INTERNETWORKING**
☐ 21. ☐ Bridges
☐ 22. ☐ Routers
☐ 23. ☐ Bridge/Router
☐ 24. ☐ Gateways
☐ 25. ☐ Intelligent Hubs/Stackables

A B

☐ 102 ☐ **COMPUTERS/PERIPHERALS**
☐ 26. ☐ Laptops/Notebooks/Sub-Notebooks
☐ 27. ☐ Micros/PCs
☐ 28. ☐ Minis
☐ 29. ☐ Mainframes
☐ 30. ☐ Workstations
☐ 31. ☐ Terminals
☐ 32. ☐ Printers
☐ 33. ☐ Cluster Controllers
☐ 34. ☐ Monitors
☐ 35. ☐ Fax/Modem Boards

A B

☐ 103 ☐ **REMOTE/WIRELESS COMPUTING**
☐ 36. ☐ PDAs
☐ 37. ☐ PCMCIA Devices
☐ 38. ☐ Wireless Data Services
☐ 39. ☐ Wireless Data Equipment
☐ 40. ☐ Wireless LANs
☐ 41. ☐ Cellular Equipment & Services

A B

☐ 104 ☐ **INTERNET/ELECTRONIC COMMERCE**
☐ 42. ☐ Internet Access Providers
☐ 43. ☐ Firewalls
☐ 44. ☐ Web Servers/Browsers
☐ 45. ☐ Internet Software Tools

A B

☐ 105 ☐ **SOFTWARE/APPLICATIONS**
☐ 46. ☐ Network Management
☐ 47. ☐ Systems Management
☐ 48. ☐ Security
☐ 49. ☐ Communications Software
☐ 50. ☐ Terminal Emulation
☐ 51. ☐ Word Processing
☐ 52. ☐ Operating Systems

A B

SOFTWARE/APPLICATIONS (cont'd)
☐ 53. ☐ Client/Server Applications Development
☐ 54. ☐ Database Management/RDBMS
☐ 55. ☐ Spreadsheet
☐ 56. ☐ Groupware
☐ 57. ☐ EDI
☐ 58. ☐ E-mail
☐ 59. ☐ Windows/Graphical User Interface
☐ 60. ☐ Multimedia
☐ 61. ☐ Graphics/DTP
☐ 62. ☐ Remote Access
☐ 63. ☐ Imaging
☐ 64. ☐ Suites
☐ 65. ☐ Middleware
☐ 66. ☐ Document Management
☐ 67. ☐ Database Server
☐ 68. ☐ Site Metering Tools
☐ 69. ☐ Computer-Integrated Telephony (CIT)

A B

☐ 106 ☐ **WIDE-AREA NETWORK EQUIPMENT & SERVICES**
☐ 70. ☐ Frame Relay Equip./Services
☐ 71. ☐ Modems
☐ 72. ☐ FT-1/T-1/T-3 Multiplexers
☐ 73. ☐ FT-1/T-1/T-3 Services
☐ 74. ☐ SONET
☐ 75. ☐ Inverse Multiplexers
☐ 76. ☐ SMDS
☐ 77. ☐ Asynchronous Transfer Mode
☐ 78. ☐ Diagnostic/Test Equipment
☐ 79. ☐ DSU/CSU
☐ 80. ☐ VSAT/Satellite
☐ 81. ☐ ISDN Equipment & Services
☐ 82. ☐ PBXs
☐ 83. ☐ Voice Mail/Response
☐ 84. ☐ Videoconferencing
☐ 85. ☐ Leased Lines
☐ 86. ☐ Switched Data
☐ 87. ☐ E-mail/On-line Services
☐ 88. ☐ 800/900/MTS Services
☐ 89. ☐ Virtual Networks
☐ 90. ☐ Outsourcing/Systems Integration Services
☐ 91. ☐ Education/Training Services

☐ 92. ☐ None of the above (1-91)

6 What is the total number of LANs, workstations/nodes at this location/in your organization?

At this location:

	LANs		Workstations/ Nodes
1.	☐	5,000+	☐
2.	☐	1,000 - 4,999	☐
3.	☐	100 - 999	☐
4.	☐	50 - 99	☐
5.	☐	10 - 49	☐
6.	☐	1 - 9	☐

Entire organization:

LANs Workstations/ Nodes

7 Check ALL that apply in Columns A and B:

A. The following network platforms are currently installed:
B. The following network platforms are planned for purchase:

A B

☐ 55 ☐ **NETWORK ARCHITECTURES**
☐ 01. ☐ SNA
☐ 02. ☐ DECnet
☐ 03. ☐ TCP/IP
☐ 04. ☐ Novell IPX/SPX
☐ 05. ☐ APPC/APPN/LU 6.2
☐ 06. ☐ NETBIOS
☐ 07. ☐ AppleTalk
☐ 08. ☐ NFS
☐ 09. ☐ Other *(please specify)* ________

A B

☐ 56 ☐ **NETWORK OPERATING SYSTEM**
☐ 10. ☐ Microsoft (LAN Manager)
☐ 11. ☐ Novell (NetWare 2.X, 3.X)
☐ 12. ☐ Novell (NetWare 4.X)
☐ 13. ☐ Windows NT
☐ 14. ☐ Windows NT/Advanced Server
☐ 15. ☐ LocalTalk (AppleTalk)
☐ 16. ☐ Banyan (VINES)
☐ 17. ☐ IBM (LAN Server)
☐ 18. ☐ IBM (PC LAN Program)
☐ 19. ☐ Artisoft (LANtastic)
☐ 20. ☐ Digital (Pathworks)
☐ 21. ☐ Other *(please specify)* ________

A B

☐ 57 ☐ **LAN ENVIRONMENT**
☐ 22. ☐ 4M Token Ring
☐ 23. ☐ 16M Token Ring
☐ 24. ☐ Ethernet
☐ 25. ☐ 100M Ethernet
☐ 26. ☐ StarLAN
☐ 27. ☐ FDDI
☐ 28. ☐ LocalTalk
☐ 29. ☐ 10Base-T
☐ 30. ☐ ATM
☐ 31. ☐ Other *(please specify)* ________

A B

☐ 58 ☐ **COMPUTER OPERATING SYSTEM**
☐ 32. ☐ DOS
☐ 33. ☐ Unix/Xenix/AIX
☐ 34. ☐ OS/2
☐ 35. ☐ OS/2 Warp
☐ 36. ☐ IBM MVS
☐ 37. ☐ IBM VM
☐ 38. ☐ Digital VMS
☐ 39. ☐ Macintosh
☐ 40. ☐ Windows
☐ 41. ☐ Windows 95
☐ 42. ☐ X Window System
☐ 43. ☐ Solaris
☐ 44. ☐ Other *(please specify)* ________

☐ 45. ☐ None of the above (1-44)

8 For which areas outside of North America do you have purchase influence? (check all that apply)

1. ☐ Europe
2. ☐ Asia
3. ☐ South America
4. ☐ Australia
5. ☐ Middle East
6. ☐ None

Do you have or plan to install client/server networks?

10 Which of the following hardware platforms are installed/planned in your company? (check all that apply)

Mainframes

	A – Installed	B – Planned
1. IBM	☐	☐
2. Amdahl	☐	☐
3. Cray	☐	☐
4. Hitachi	☐	☐
5. Unisys	☐	☐

Minis

	C – Installed	D – Planned
1. IBM	☐	☐
2. Digital	☐	☐
3. Tandem	☐	☐
4. Unisys	☐	☐
5. AT&T GIS	☐	☐
6. HP	☐	☐
7. Data General	☐	☐

Which of the following do you have installed/planned: (USE NUMBERS ONLY)

	At this location:		Entire organization:	
	E Servers	F Clients/Nodes	G Servers	H Clients/Nodes
1. Power PC				
2. Power Macintosh				
3. Macintosh (Other)				
4. Pentium-based				
5. 80486-based				
6. 80386-based				
7. 80286-based				
8. RISC-based workstations				
9. Other				

11 What is the estimated value of networking equipment and services that you help specify, recommend or approve annually? (check one only)

01. ☐ $100 million or more
02. ☐ $50 million - $99.9 million
03. ☐ $25 million - $49.9 million
04. ☐ $20 million - $24.9 million
05. ☐ $10 million - $19.9 million
06. ☐ $5 million - $9.9 million
07. ☐ $1 million - $4.9 million
08. ☐ $500,000 - $999,999
09. ☐ $250,000 - $499,999
10. ☐ $249,999 or less
11. ☐ None of the above

12 Estimated gross annual revenue of your entire company/institution: (check one only)

1. ☐ $10 billion or more
2. ☐ $1 billion to $9.9 billion
3. ☐ $500 million to $999.9 million
4. ☐ $100 million to $499.9 million
5. ☐ $50 million to $99.9 million
6. ☐ $10 million to $49.9 million
7. ☐ $5 million to $9.9 million
8. ☐ $4.9 million or less
9. ☐ None of the above

13 Estimated number of employees at this location/in entire organization:

At this location:	Entire organization:
1. ☐ Over 10,000	1. ☐ Over 10,000
2. ☐ 5,000 - 9,999	2. ☐ 5,000 - 9,999
3. ☐ 2,500 - 4,999	3. ☐ 2,500 - 4,999
4. ☐ 1,000 - 2,499	4. ☐ 1,000 - 2,499
5. ☐ 500 - 999	5. ☐ 500 - 999
6. ☐ 499 or less	6. ☐ 499 or less

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